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# JOURNAL
OF THE
# AMERICAN VETERINARY MEDICAL ASSOCIATION

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*Volume CXIII* DECEMBER 1948 *Number 861*

# "TEN EVENTFUL YEARS"

## IN THE ADVANCEMENT OF VETERINARY MEDICINE

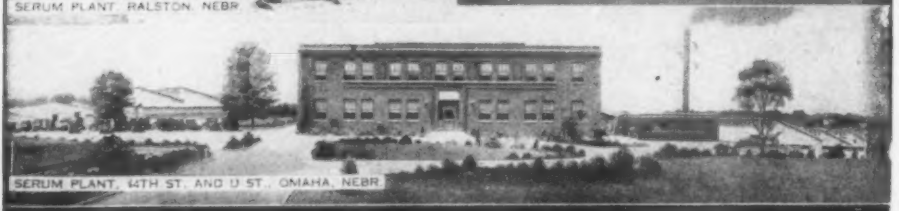
Independent of a global war, the decade now coming to an end saw the ascendance of veterinary science soar to unprecedented heights in public estimation and good will, thanks to the defense of orderly coöperation in the educational, clinical, research, and commercial fields.

But by far the most impressive advance was the realization that the country's $9 billion livestock industry had not been provided with an adequate college-trained personnel to fulfill the obligations brought out in the course of the advancement.

**THE OPENING OF SIX ADDITIONAL COLLEGES TO CONFER THE DEGREE OF DOCTOR OF VETERINARY MEDICINE REFLECTS THE NEED AND POPULAR DEMAND FOR AN ADEQUATE VETERINARY SERVICE.**

HOME OFFICES AND BIOLOGICAL LABORATORIES, OMAHA, NEBR.

SERUM PLANT, RALSTON, NEBR.



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# Preventive Veterinary Medicine

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*San Francisco, California*

IN THE preface to his classical treatise "The Rise of Preventive Medicine," Sir George Newman makes the significant statement: "The ideal of medicine is the prevention of disease, and the necessity for curative treatment is a tacit admission of its failure; yet the ways and means of prevention, from the earliest times, have constituted a part of the history of human conduct in the individual and the community rather than being merely instruments of the Medical Art." Without reservations, but with certain modification, this concept may be said to apply with equal force to veterinary medicine. It may be added with truth that, until relatively recently, no effort has been made to acquaint those concerned with animal husbandry with the important implications of the statement. Schools of veterinary medicine are still sending out graduates unprepared to solve some of the most serious problems they will have to face in the immediate future. Comprehensive efforts to protect the millions who suffer economically and physically from diseases of the animals they raise have not been made. There will be no change unless the whole profession of practitioners assumes its responsibility for preventive as well as curative veterinary medicine. Whatever benefits society may reasonably expect from organized services scattered through official agencies, the real pivot, the interpreter, the exponent of preventive veterinary medicine is the veterinary practitioner. Time may not be far distant when the animal husbandryman, the owner of a dog, and the breeder of birds for food and pleasure will demand professional advice about both sanitation and prophylaxis. While one must beware of prophecy and remember that ignorance remains greater than knowledge, it does seem profitable to review the evolution of ideas just expressed.

From the George Williams Hooper Foundation, University of California, San Francisco, Calif.
Presented before the first General Session, Eighty-fifth Annual Meeting, American Veterinary Medical Association, San Francisco, Calif., Aug. 16-19, 1948.

## Development of the Concept of Prevention

The practice of preventive medicine had its origin in the ancient world. Man, in the darkness of ignorance, made spasmodic efforts to stem the tides of pestilences which threatened to overwhelm him. He slowly learned that without knowledge he was without hope in discovering the rational means of prevention. Thus, the history of preventive medicine and likewise, in a small measure, of preventive veterinary medicine is the history of seeking and finding of the essential facts. At the end of the Golden Age of Greece, Hippocrates described the sufficiency and healing power of nature and taught that the true physician observes her method and copies rather than modifies it. Through the Middle Ages, when medicine slept, knowledge accrued through Leonardo da Vinci, Vesalius and, in the eighteenth century, through experimentalists — Harvey, Helmont, Sydenham, and the practitioners. These men revolutionized the philosophy of science, anatomy, physiology, and the clinical study of disease. These epoch makers handed down not only a body of knowledge but also a way of working. There is no doubt that the way of learning had in the long run a greater effect than the learning itself. For centuries, men had believed that certain diseases were caused by external living agents and conveyed by contagion. This view gained increasing acceptance

as men became familiar with the idea of parasitism, as they conceived fermentation and putrefaction to have a vital cause, and as they eventually saw for the first time with their own eyes the anthrax bacillus in diseased tissue.

From the immortal works of Louis Pasteur, Robert Koch, Theobald Smith, and others, there followed that wonderful succession of discoveries which will distinguish for all time the age in which we live. But the discovery of the disease-producing bacillus was only the first step in establishing a trinity of knowledge. What did the bacillus do? What could restrain, prevent, or control its activity? Through the brilliant work of Roux and Yersin, Metchnikoff and von Behring, the far-reaching concept was established that, though the healthy body of man and animal may be subject to infection by a bacillus and suffer its toxic effect, the body may of its own cells and fluids provide defense—destroy and assimilate the invading bacillus. Further research led to the detection of viruses and to understanding of the place of antibodies in the body defense, and of arthropod vectors in the spread of infectious agents. Lastly, in 1910, Ehrlich's discovery of an arsenical compound capable of destroying the parasite in the body completed the illuminating chapter. However, this is not the whole story. Man soon learned that bacteria are unstable and variable, and their functioning—action and reaction—depends on many circumstances both within and outside the living body and their host.

### The Nature of Disease

Just as in medicine, the foundation of preventive veterinary medicine is a broad knowledge of the nature of disease. The concept of the contagious nature of disease inspired the magnificent advances just cited. The reduction in the number of deaths due to infectious diseases attests to its value. But today, the doctrine that there is a single specific cause for each disease entity is untenable. A purely bacteriologic explanation pays little heed to the fact that health depends upon a complex series of related processes and functions. The essentials of disease are two—an animal and an organism; these interact, react, and are acted upon by external forces. The more quickly it is recognized that causation is a constellation of predisposing, provoking, and perpetuating factors, the more certain will progress be made. To reduce the approach to every disease to concern with one provoking factor continues to retard progress.

In regard to the bacterial or parasital agents of infection, it must be borne in mind that they also are governed by laws of evolution, degeneration, and decay. It is not enough to know merely that infection is present in the animal body; one must know what the characteristics of the invading organism are, whether it is present in great numbers or few, where it entered the body, where it operates in the body, and what its plan of campaign is. These facts must be known before the methods of preventive veterinary medicine can be effectually applied. The animal body—the host—is the soil; the bacillus—the parasite—is the seed; the two interact. The seed affects the soil which in turn modifies the action of the seed. Further conceptions of pathologic processes are continually expanding in relation both to new knowledge of pathology and to the variations in the clinical character and type of the disease. For disease is a varying process; it is not a fixed entity. It may affect the whole body or only a special organ or tissue, but its action begins in the cell. Checking and controlling it are interrelated not only with anatomy and physiology, not only with pathology, with clinical observation and with postmortem examination, but with the new applications of physics, of chemistry, and of biology.

### Heredity and Nutrition

Such dominant influences as heredity, nurture, nutrition, and habits of the animal—all predisposing or perpetuating elements—rarely receive the attention they deserve. An animal of sound heredity may become susceptible to disease as the result of inadequate or unsuitable food, unwholesome surroundings, excess fatigue, or diminution of vitality by previous disease; conversely, the effect of an unfavorable ancestry may be modified by favorable surroundings or by improved nutrition in its broadest sense. Aside from the physical world and its atmosphere—the climatic conditions—there are communal factors which influence the incidence of disease. Density of animal populations, movement of groups, age and sex distribution, and environmental conditions such as domesticity and the attitude of the owner, govern the prevalence of disease. Specific preventive measures and treatment are also an integral part of the complete concept of a disease. Preventive veterinary medicine not only concerns the external environment of the animal, the clinical and morbid phenomena of disease, but demands an understanding of those unseen processes of attack and defense which find their sphere in the cells and fluids of the body and their influence upon the infecting or disturbing agent. How far indeed is all this from the days of witchcraft, the concept of "visitations" and penalties, the pronunciamentos, papal bulls, and similar legalistic gymnastics. But how little is it as yet appreciated and put into practice.

### The Importance of Epidemiology

"The occurrence, the distribution, and the types of the diseases of mankind in distinct

epochs of time, and at various points of the earth's surface, will render an account of the relations surrounding the individual and determine his manner of life," defines, according to Hirsch, the province of the science of epidemiology. Again, this definition can be equally applied to the field of epizoötiology — the branch of science which deals with widespread diseases among the lower animals. A glance at the available knowledge shows that while there is a certain constancy in the behavior of epidemics, there are wide variations, interepidemic periods, endemic, epidemic, and pandemic characters as yet not, or only partially, understood. It is always necessary to take into account the whole history of each disease over months and years and even centuries. Disease is, paradoxically, not capricious. It follows the laws of cause and effect. To understand their action and meaning, one must with patience (a) collect vast bodies of natural facts; (b) check these facts by observation and the experimental method and note the atypical and aberrant conditions; (c) differentiate and classify these natural facts; (d) draw valid deductions and standardize them by experience; (e) integrate the facts, building a synthesis as far as possible and seeking ways and means of application. This is the rational method, but to find truth it must be applied in the scientific way by allowing the germ and the disease to speak for themselves. Causative factors of disease and the animal must be studied under natural conditions, in fact, to speak for themselves. A clinical study artificially carried out, or hidebound by traditions, reproduces the errors of those who went the route before. One must study and observe, and observe and study.

### PREVENTION INCREASES FOOD PRODUCTION

Alongside the growth of medical knowledge, there slowly came into being an extension of its application. Human needs and aspirations furnish a continuous motive power for inquiry as well as for action. There are, first of all, the primary biological needs of food, shelter, health, and enjoyment. After these come the means of providing these requirements in the form of productive industry, transport, and communication, as well as the whole administrative, economic, and political mechanism of civilized society. But, alas, society not only lives, it grows. Old needs require better satisfaction and new ones arise. Health is a necessity, which might well come before any of the others but for the fact it is dependent on satisfactory food and shelter. The first stage in the conquest is to give those conditions of food and surroundings now enjoyed by less than one-third of the world's population to the remaining two-thirds to enable them to reach a desirable standard of health. In order to bring food supply to an adequate level by 1960, which involves accommodating for a 25 per cent increase in population, production of the principal foods would have to be increased as follows: cereals 21 per cent, root crops 27 per cent, sugar 12 per cent, fats 34 per cent, peas and beans 80 per cent, fruits and vegetables 163 per cent, meat 46 per cent, and milk 100 per cent.

The magnitude of the task of so increasing food production has been fully emphasized by the survey of the Food and Agriculture Organization. The director general of the FAO, Sir John Boyd Orr, has succinctly stated the present-day dilemma in the words: "It is not the atomic bomb but the food crisis that may destroy us." There can be no question that a minimal application of science could increase the rate of agricultural production many fold. This is not the place to inquire into the improvements which could be made through the study of soil and of plants, but it is the place to direct attention to the problems of the livestock industry. A perusal of diverse reports conveys the conclusions that quantitative expansion would do untold harm, but that qualitative expansion can yield a much more rapid increase in livestock products. Through efforts of the veterinary profession, the productivity of existing stock may be increased. Improvement of stock and management and, in particular, control of livestock diseases constitutes the greatest contribution the profession can, and will, make to the world's well-being. Prevention of the continuous colossal losses of milk, eggs, meat, and other animal food products would do much to alleviate the progressively increasing food shortage. Further advances in knowledge of gland physiology and genetics under the supervision of the veterinarian may produce great changes in animal husbandry. Up till now, the changes have had largely commercial incentive, and though they have resulted in much greater yields of such products as eggs and milk, the expense has been the increase in the incidence of disease. Forcing animals is not only unnatural, but inefficient.

There is no reason why, in a well-organized economy, the well-being of animals should not be the primary consideration of animal husbandry.

## THE POSITION OF PREVENTIVE VETERINARY MEDICINE

It is in connection with the maintenance of animal health that preventive veterinary medicine assumes its important rôle. Unfortunately, the position of the practice of preventive veterinary medicine can not as yet be defined, largely because conditions which govern it are transitional and progressive. Although a large body of knowledge and experience and a desire to apply it exist, they are not present

among the people concerned with animal husbandry. Further, the available knowledge has not been applied to the precise problems to be solved. The result is confusion; public efforts tend to become arbitrary, sporadic, and perhaps a little capricious. While, on the other hand, the veterinary practitioner without an official appointment who desires to apply the principles of prevention soon finds himself in an economic dilemma. It is a well-known fact that livestock owners have little sentiment for service charges. Instead of consulting and following the advice of the trained veterinarian, only too often they listen to the untrained and inexperienced who pose as veterinarians. Lack of proper values and ignorance are, in part, reasons for this unfortunate situation. Granted, ailing animals do not always complain clearly enough for the owners to determine that they are not well. But even if the illness is recognized, the majority of owners do nothing until the symptoms are alarming and often not even then.

An appreciation of the function of prevention in maintaining animal health and, consequently, of proper values can in time be created by good education. The wisest course for the veterinarian is to inform and instruct livestock owners constantly and competently. As soon as he knows with absolute certainty what causes a disease, it is his duty to convert this scientific knowledge into public information and thus create a demand for action. Too often in speaking before groups he tends to lay too much stress on what has been done and too little on what should be done. Just as the artful politician converts private desires into public demand, so can the trained veterinarian create a demand for preventive services. In this connection, two aspects in this educational program must be stressed with increasing emphasis. Although it is customary to measure the effect of a livestock disease on the basis of the monetary loss of those who own the animals and the cost to taxpayers who supply the funds for its prevention or control, the direct and indirect effects on human welfare are rarely measured. Some recent estimates by Huddleson, Fagan, and others reveal the staggering losses in milk and meat caused by Brucella infections. These data reflect in no uncertain terms the manner in which one animal disease affects human welfare in general and the cattle- and hog-raising industries directly.

As far as it is apparent, either this information has not yet reached the stock owner, or, since he is principally concerned with stopping abortions in his herd, he has failed to appreciate the broad social implications. To many farmers, disease still seems something occult, supernatural, beyond their understanding or control. Doubtless, few are aware of how infection of livestock may affect their own families and the population at large. The significant data collected by Jordan, Borts, Spink, and others are rarely interpreted to the man on the farm or to the owner of companion animals. Once animal owners recognize that their acts or omissions affect their own health and that in a large measure they have control within their power, preventive veterinary medicine will assume the position it deserves. However, it is well to remember that great reforms are dependent for their achievement upon the coöperation of enlightened and responsive people. Education of the animal owner becomes the instrument of reform, and in no sphere of national well-being is it more necessary than in relation to preventive medicine and its allied field of veterinary medicine. In the fields of health and animal husbandry, the first essential in securing coöperation is to develop the inherent desire of the people to work together. The most powerful method is to present the groups involved with an inspiring objective, with an ideal; men and women lose themselves in working for the common good. A veterinary practitioner with an ideal may indeed alter the economic aspect of a rural community blighted by animal disease.

## THE VETERINARY PUBLIC HEALTH SERVICES

With the approval of the United States Federal Meat Inspection Law and the Federal Food and Drug Act in 1907, followed by state and local laws entrusted with the protection of milk and milk products through inspection of the animals furnishing the milk or the flesh, the veterinary public health services were initiated. In the course of the past forty years, and in particular since the Social Security Act of 1935 revolutionized the United States

Public Health Service and immeasurably enhanced the public interest in national health affairs, the field of the public health veterinarian has begun to expand. On account of his training and the scope of his services, more and more responsibilities are referred to him. Just as "public health" in medicine consists of the practical application of biologic laboratory research, epidemiology, sanitary engineering, and mass education toward safeguarding the community against disease, so does "public health veterinary medicine" concern itself with the protection of society against the infections transmissible from animals to man. While veterinary public health is a fully recognized function of government and is part of a national health program, one hears criticisms and voices of fear that this organization will in time engulf the freedom of the veterinary practitioner. Naturally, the word "freedom" without qualifications is an abstract noun and the meaning varies with each person's sense of values. In sober moments of meditation, every one must surely realize that no one can be fully free. Indeed, those who are most voluble in crying aloud that they will never, never be slaves usually endure without a murmur the slavery of a routine occupation. Aside from the expression of fear that freedom of action will be lost, it is murmured that the veterinarian engaged in public health work sacrifices professional ideals and relationships with accompanying reduced remuneration. All these fears are dispelled provided the practitioner has a comprehensive grasp of the problems involved, and a clear perspective of the value and importance of the services he renders to society.

It may be said, without any fear of contradiction, that the extent to which the state or national government in its responsibility will invade the present field of private veterinary practice will depend largely upon the extent to which the veterinary profession as a whole appreciates and applies the principles of preventive veterinary medicine. The tasks and obligations of the profession have already been sketched; suffice it to emphasize that the preoccupation of preventive veterinary medicine, in contrast to the administrative impersonal activities of public health veterinary medicine, is specific and highly personal. It deals with the closest relationship of the profession with the owner of animals and birds. Immunization of animals against certain infectious diseases, establishment of the most favorable state of nutrition, early diagnosis of incipient disease or debility induced by parasites, and application in each case of the skills of veterinary medicine and surgery for the prevention of serious losses in the herd population are among the functions of the practicing veterinarian. With the formulation of programs in which both the departments of public health and of agriculture coöperate, the future position of the practicing veterinarian is fully assured. New and additional services, together with a fuller appreciation by the stockman, will create new business and fear of decreased remuneration should be dispelled.

The veterinary practitioner has two distinct functions in the community in relation to health protection and promotion. First, when the state grants him a license to practice veterinary medicine he virtually agrees that he will carry out all his duties and responsibilities in relation to the promotion of the official public health services in the community. Second, he obligates himself to incorporate the principles of prevention as an essential part of his daily clinical practice.

The Veterinary Public Health Division has no satisfactory method of discovering animals suffering from diseases transmissible to man except through the veterinarian. A simple machinery for reporting these diseases has been devised in some states. The United States Public Health Service, in coöperation with the Georgia Department of Health and the Colorado Department of Health, has inaugurated a system of reporting animal disease of public health significance. The veterinarian receives an instruction sheet and a small supply of franked report cards similar to those furnished the physician for the reporting of human communicable diseases. If the veterinarian assists in the reporting of these diseases, he is appointed a collaborating epidemiologist in the state department of health and the United States Public Health Service. The information concerning the prevalence of certain infections thus obtained is invaluable in studying and in planning the execution of protective measures. Equally valuable

is the reporting of pathologic findings in local meat-inspection services. Dr. James H. Steele has recently reported that bovine tuberculosis lesions are again being seen in certain local abattoirs of the East. He suggests that the state veterinary public health services, through the inspectors at the abattoirs, be entrusted with the collection of the statistical data on the incidence of parasitic and bacterial infection which, in turn, are given to the federal or state bureau of animal industry for consideration and action. An epidemiologic intelligence survey for disease of animals awaits development. In the future, the Veterinary Public Health Division may, upon request, furnish aid in the verification of the diagnosis. Particularly urgent is the establishment of laboratory services.

The present inadequacy of diagnostic services in many states leaves a great deal to be desired. It is generally conceded as a fundamental principle that an official health agency should do as little clinical work as is compatible with protection of the general health of the community. This principle applies with equal force to the veterinarian. Whenever mass immunization will prevent outbreaks of disease, the health department is under obligation to carry it out by the most effective and least expensive means. The position of the veterinarian in these official activities has not as yet been formulated and defined. Misunderstandings will arise and mistakes will be made if the veterinary public health official, or the health officer, fails to interpret his policies and activities to the practicing veterinarian and through him to the stock owner. Experience has shown that effective coöperation can be secured by mutual trust, confidence, and respect in open discussions at the conference table. A coöperative program can be developed from the pooled opinion and expert experience of all concerned in the welfare of the community.

## TRAINING IN PREVENTIVE AND PUBLIC HEALTH VETERINARY MEDICINE

From what has been said, it must become clear that the veterinarian must have suitable training in preventive veterinary medicine. As an educated man, he should be familiar with the philosophy of a national health program in the light of the preceding discussion. In his early years as a veterinary student, he should be imbued with the idea of preventive action as an integral part of clinical veterinary medicine. His responsibilities to the livestock industry and to animal husbandry should be made clear. The preventive aspect should be stressed whenever possible. Finally, he must be trained in order to appreciate his relationship and duties to the public health agency of the community, state, and federal organizations. Opportunity should be afforded him to learn the part that a private veterinarian will play in the promotion of community health and national welfare.

A well-informed veterinary profession is an essential keystone in a sound, well-balanced, effective public health program and a very important pacemaker in the future policies to be adopted by animal husbandry and the livestock interests. It is the responsibility of the schools and colleges of veterinary medicine to furnish this information to students and graduates. Whether it is advisable to create, as has been suggested by Dr. A. F. Schalk, a special department of preventive veterinary medicine is best left undecided. Additional courses will be required. The proposals offered by Dr. Steele have definite merit, but are obviously contingent on the availability of the men trained in the respective fields. Experience in medical schools has taught that lectures in preventive medicine are frequently uninteresting when burdened with a description of environmental sanitation without practical demonstrations. The seminar type of teaching is admirably suited to create interest and to secure the available talents from other departments of the school or college. An introductory lecture during the second year followed by elementary training in statistics should prepare for special instruction in animal ecology and epizoötiology.

The technique of health education, with reference to the use of visual material, deserves special consideration. The training of the veterinarian in this branch is particularly important. He must compete with salesmen and quacks for the attention of the livestock owners. He must try to help them to think logically and critically, and to supply them with accurate and pertinent information on which to exercise their minds. This entire field requires extensive and skillful exploration. At some place in the curriculum, the legal organiza-

tional and economic aspects must be given proper recognition and treatment.

All these requirements presuppose the existence of the stimulating influence of research. No scheme of practice in preventive medicine is complete unless it includes opportunity and provision for investigation and the acquisition of new knowledge. Research of an elaborate kind, principally undertaken in the well-equipped laboratories of the veterinary schools and experiment stations of colleges of agriculture, has fulfilled the needs of the past. The graduate schools in the physical and biological sciences, however, have become increasingly important sources of medical research and training. Their importance in the training of veterinary scientists must be appreciated, since their influence in all likelihood will continue to increase. Systematic investigation, experiment, and disinterested epizoötiologic inquiry is the life blood of preventive veterinary medicine. Emphasis is placed on the disinterested investigations of herd disease and mortality, since too often the inquiries along these lines are undertaken for the sole purpose of achieving an immediate practical result. Whenever a study of this sort is contemplated, it should be realized that for some time the value may not become apparent, and, consequently, the undertaking should be financed on a long-term basis. It is a common characteristic that the value of sound scientific work is largely latent and preparatory to action. The field of investigations lying before the veterinarian is almost boundless. Veterinary education, properly nurtured through research, will advance preventive veterinary medicine and consequently the profession.

It is anticipated that under the influence of the new orientation of the veterinary curriculum, a percentage of the graduates will be interested in veterinary public health as a career. Special training in public health methods is as important a qualification as veterinary training. How can the prospective veterinary public health officer obtain the proper preparation? There are several schools of public health that are equipped to offer a formal academic course of training. Already, a number of veterinarians who had spent some time in a phase of public health activity have taken this formal public health training. They are now competent leaders in developing the expanding program directed toward the ultimate control of the animal reservoir of human disease. Under the provisions of the Social Security Act, the United States Public Health Service gives grants to the states, whereby suitable candidates who are selected by the state health officer may receive appropriate training for one academic year at an accredited university. On completion of the theoretical training, the trainee agrees to return to the state department of public health for at least one year of service. Unfortunately, this type of training is by necessity limited, since the funds are inadequate to grant scholarships to all deserving candidates. As an alternative, the schools of veterinary medicine may have to devise some type of postgraduate intramural and field training. With the opportunity for challenging and constructive service in the field of veterinary public health rapidly developing, the needs for specific education and training are increasing. The challenge must be met.

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## Veterinarian Needed in Alaska

The following letter, received by Dr. W. A. Young of Chicago, was referred to the JOURNAL for publication. Anyone interested may contact the Alaska Humane Society direct.

October 10, 1948

Until last July, Fairbanks and the immediate area has had the benefits of the services of the Ladd Air Force Base veterinarian and veterinary hospital. At that time the Army veterinarian was re-assigned and no replacement has been made due to shortage of such professional men.

It has been brought to the attention of our Board of Directors that, if it were possible for an outstanding veterinarian to come to Fairbanks and take over the duties at the Army veterinary hospital—he would have enlisted men's assistance there—approval might be obtained from the Army, and an arrangement wherein the veterinarian could be put on a Civil Service salary plus professional service fee might be made. Inquiry will be made immediately from Army headquarters regarding this possibility, and as soon as I hear from you I should have the necessary information for you.

There is a great need for such services, and I know that income from such a profession here would be attractive.

s/MARIE QUIRK, *President,*
*The Alaska Humane Society, Inc.*
*P.O. Box 523, Fairbanks, Alaska.*

# Veterinary Laboratories in the U. S. Zone of Germany

LIEUT. COL. FRANK A. TODD, V.C., U.S. Army

THE GERMAN veterinary service is charged with responsibility in two major fields, *i. e.*, economic and public health. In the former, the prevention of loss of livestock, and the resultant loss of food, is dependent upon the control of animal diseases, while the latter requires the control of those diseases transmissible from animals to man and the supervison of sanitary conditions under which foods of animal origin are handled and processed. The success of this service influences, indirectly, the health and welfare of the occupation forces.

German veterinary laboratories hold an important rôle in the success of this service by providing scientific means for controlling animal diseases and definite methods for determining the hygienic conditions of meat, milk, and their by-products consumed by the population.

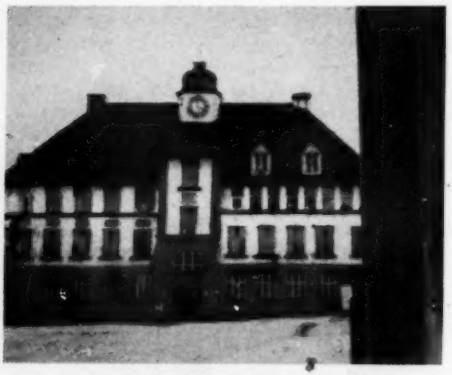

Fig. 1—The state veterinary laboratory for Bavaria, Schleissheim, Germany.

Prior to the occupation, the veterinary service of Germany was a highly centralized national organization, administered from the Reich Ministry of the Interior. The administrative organization was complete, with veterinary officials located at the national, state, district, and county levels of government, who supervised all veterinary activities within their areas, including the responsibility for initiating control measures necessary for combating animal diseases. Certain of these officials were responsible for supervising the activities of the veterinary laboratories.

The veterinary laboratories rendered various services affecting the health and economy of Germany. The more common included animal disease diagnosis, food examination, production and standardization of biological products, educational assistance, and research.

In 1939, Germany had 11 national institutes with veterinary departments, 38 state veterinary laboratories, 10 universities with veterinary laboratories for research work, 11 privately owned institutes that provided veterinary research service, and each large slaughterhouse maintained a laboratory for the examination of meat.

At present, the U.S. Zone of Germany has two former *Reichsinstitutes*, nine state veterinary laboratories and two veterinary schools, two agricultural schools with veterinary departments, two large privately owned institutes, and 19 slaughterhouse laboratories (*see* map).

### FORMER REICH LABORATORIES

The former Reich Public Health Office (*Reichsgesundheitsamt*), located in the U. S. sector of Berlin, previously functioned under the Reich Ministry of the Interior. In the veterinary department of this organization were many scientists and specialists who acted as consultants to the Ministry of which they were a part. In former times, this institute was one of the leading veterinary research laboratories in Germany. Work was done in all phases of veterinary science such as animal diseases, animal nutrition, food hygiene, standardization of disinfectants, and the production and standardization of vaccines and pharmaceutical products. Research work, dealing with animal diseases common to the entire country, was carried on by the veterinary department of this institute, which also administered the German veterinary service and dealt with veterinary legislation, veterinary police, personnel, education, animal disease control, food examination, meat inspection, and laboratories. The statistic bureau of this institute collected information on the incidence and location of animal dis-

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eases, meat inspection, etc., from all parts of Germany, which they organized and published for distribution throughout the Reich and other countries.

During the war, the *Reichsgesundheitsamt* was badly damaged and most of the laboratory equipment lost, so that now only a limited amount of work is conducted there. In the absence of a central German government, this institute has lost its identity as a central laboratory for the nation. With the occupation of Berlin by the four allied powers, the former *Reichsgesundheitsamt* has become a part of the magistrate of Berlin, functioning under the supervision of the Allied *Kommandatura*, under which limited activity is conducted with technical veterinary assistance made available to the occupied zones upon request. In addition to the consultant service, small amounts of biological products such as mallein, tuberculin, and brucellosis cultures are prepared, serologic tests for several diseases are made, and limited research is conducted on such diseases as swine erysipelas, infectious anemia of horses, glanders, dourine, and fowl pest.

The Paul Ehrlich laboratory (*Staatsinstitut für experimentelle Therapie*), located at Frankfurt am Main, was established about 1900 as a central agency for the standardization of human and veterinary biological products produced in Germany, as required by law. Although this institute was damaged considerably during the war, it is still conducting routine laboratory work and some research, with the major part of the work being done in the substation, established during the war, at Marburg an der Lahn. It continues to serve the whole of Germany, as formerly, but is administered under the supervision of the government of Land Hesse, U. S. Zone.

## STATE LABORATORIES

The principal laboratory work pertaining to animal disease control and food hygiene is carried on by state veterinary laboratories located throughout the country. In these laboratories, generally all tests and examinations necessary for disease diagnosis and food control work are performed, and the antigens required for the various tests and the live culture used with immune serum for the simultaneous method of immunizing pigs against swine erysipelas are produced.

Since the responsibility for animal disease control rests with the veterinary officials, the state veterinary laboratories are under the supervision of the office of the chief veterinarian of the state, located in the Ministry of the Interior. The laboratories are directed by veterinarians who are responsible to the state veterinarian for their administration and activities.

If diagnostic service is required to determine the disease present in sporadic outbreaks, or if laboratory assistance is necessary for the control of certain infectious diseases, the state veterinary laboratory provides such aid. Specimens from suspected communicable diseases are submitted by the local state veterinary official to the laboratory for examination. Control measures are accomplished by the local practitioners under the supervision of the state official. Generally, practitioners seek aid from the state laboratories when noncommunicable diseases appear in local livestock.

The German state laboratory also provides veterinary specialists for such problems as sterility, nutrition, and control measures for unusual animal diseases. These specialists sometimes direct statewide programs for the control or eradication of particular animal diseases.

Samples of meat and meat products from all animals slaughtered in the small villages where no veterinary inspection is available are submitted to the state laboratories for examination. From time to time, samples are also submitted from the retail shops by the veterinary police officials. Examinations of this latter group include qualitative analysis.

The health of dairy animals and other factors determining the hygienic quality of milk are supervised by official veterinarians. Samples of milk, sputum, and other body discharges are collected from those animals suspected of open tuberculosis and forwarded to the laboratory for examination. Milk, received by the dairies and pasteurizing plants, is checked by the local veterinary official to insure proper sanitary conditions. Examinations for fat content and chemical analyses of milk are carried on by lay personnel at other types of laboratories.

All the state veterinary laboratories in the U.S. Zone, with the exception of the one in Schleissheim near Munich, sustained major war damage. The activities of these institutes since the war have been limited, due to the need for repairs, lack of equipment, shortages of politically approved and technically qualified personnel, shortages of electricity, fuel, and supplies of glassware, and laboratory animals. All have

been given emergency repairs and are slowly being refitted so that they can provide the necessary service.

By the end of 1947, the veterinary laboratories in the U.S. Zone were performing over 15,000 tests and examinations in the control of animal diseases and over 2,700 tests of meat and other food products each month.

Several animal diseases that had been absent from Germany for years appeared at the end of the war. Glanders and dourine

Fig. 2—Lieut. Col. F. A. Todd, former chief, Veterinary Affairs, U. S. Office of Military Government, chief veterinarian for Land Bavaria (left), and the director of the state veterinary laboratory, Schleissheim, Germany.

were introduced by the German army as it withdrew with its horse units. Expellees from the eastern countries entering the U.S. Zone of Germany have brought similar problems. Zone-wide testing of horses for glanders and dourine has been carried out as a means of eradicating these diseases. Tuberculosis and brucellosis increased in incidence during the war years. Programs for the control and reduction of these diseases are being worked out and necessary action begun by the German veterinary authorities. A large part of the burden of these disease control measures must be assumed by the state veterinary laboratories.

### BAVARIAN STATE VETERINARY LABORATORY

Generally speaking, the laboratory at Schleissheim (*Veterinaer-polizeiliche Anstalt Schleissheim bei Muenchen*) at the present time carries on the activities that were characteristic of these institutes prior to the war. This laboratory was only slightly damaged and is now completely repaired. It consists of a large, centrally located building together with several stables, a large administration building, and provides adequate accommodations for departments of administration, food control, pathology and bacteriology, diagnosis and postmortem examinations, serology, biological production, education and instruction, and shipping and receiving. The stables house the animals used in the production of serums and vaccines, the standardization of biological products, the isolation of certain organisms, and miscellaneous diagnostic procedures.

In addition to the laboratory service provided by the Schleissheim institute, facilities are available for instruction in veterinary subjects. Preparatory training courses are given here to all applicants seeking appointments to the official state veterinary service of Bavaria. These courses

Fig. 3—Classroom at the state veterinary laboratory at Schleissheim, Bavaria, used to conduct training and refresher courses for state veterinary officials.

provide instruction in bacteriology, pathology, animal hygiene, cattle breeding, food control, and veterinary jurisprudence.

Training and refresher courses covering the latest scientific developments in the field of veterinary medicine are given from time to time to veterinary officials, practitioners, and food inspectors of the state.

### UNIVERSITY LABORATORIES

The University of Giessen includes a veterinary school providing a complete course of instruction leading to a veterinary degree. Badly damaged during the war, the laboratories at this school conduct

research work and special studies of animal diseases in coöperation with Hessian state veterinary officials. The veterinary school of the University of Giessen produces vaccine for Borna disease and maintains a state poultry laboratory for pullorum disease testing in chickens and the diagnosing of fowl diseases. In addition to the undergraduate veterinary instruction, this school presents veterinary short courses and instructional courses in new methods of diagnosis, treatment of animal diseases, food hygiene, and current research investigations. These short courses are conducted under the auspices of the Hesse Veterinary Society and are made available to all veterinarians of the state.

The veterinary school of the University of Munich provides, at the present time, a preclinical veterinary education including limited laboratory instruction. Heavy war damage resulting in a lack of facilities and equipment, together with a shortage of qualified instructors, is the reason for the limited educational facilities offered by this institute.

The two agricultural colleges possessing veterinary departments did not sustain war damage. One is located at Hohenheim near Stuttgart, Wuerttemberg-Baden, and the other at Weihenstephan near Munich, Bavaria. Limited research and special studies pertaining to animal breeding such as heredity, feeding, sterility, and stable hygiene are conducted at these schools. These two agricultural schools provide instruction in veterinary anatomy, bacteriology, animal breeding, etc., for the agricultural students in attendance at the university, similar to that offered in the United States.

## COMMERCIAL LABORATORIES

The *Behringwerke*, with biological production laboratories located in Marburg, was established in 1893, when Professor Emil von Behring, in conjunction with others, began to produce diphtheria antitoxin on a commercial basis. These laboratories were brought under the control of the I. G. Farben industry in 1930 and in breaking up the I. G. Farben combine the *Behringwerke* was, in July 1945, placed under the direct control of the U.S. Army. Army veterinarians have since supervised the activities of this establishment.

The *Behringwerke* is one of the largest enterprises producing serums and vaccines for man and animals in Europe, and during peacetime 30 per cent of its output met 90 per cent of German requirements. The laboratories were not damaged during the war and continue to produce large quantities of biological products for both human and veterinary needs. Aside from the production capacity of this establishment, research continues on more than 30 separate scientific problems. Several important veterinary products, *i. e.*, canine distemper serum and foot-and-mouth disease vaccine were not produced by the *Behringwerke*,

Veterinary Laboratories
U. S. Occupation Zone of Germany.

nor in any other laboratory in the U.S. Zone of Germany. Under the supervision of U.S. Army veterinary officers, facilities have been provided for the production of these two products.

The Merck firm at Darmstadt is another large agency that produces drugs and biochemical products for human and veterinary medicine. The veterinary department of this firm also carried on testing experiments of veterinary products and research in the development of new drugs. War damage to this company was great. However, work increases as repairs are made and supplies become available.

## SLAUGHTERHOUSE LABORATORIES

The custom in parts of Germany to eat meat and meat products in a raw or

partially cooked state necessitates a rigid veterinary inspection of these products at slaughter. All large slaughterhouses in Germany are equipped with veterinary laboratories where direct microscopic examinations and the inoculation of culture mediums are made of meat from all abnormal carcasses. These laboratories also provide facilities to determine the presence or absence of trichinas in samples of meat from all carnivorous animals, both domestic and wild, slaughtered for food consumption. Technical specialists known as trichina inspectors discharge this responsibility under the supervision of veterinary officials.

Most of the large slaughterhouses of Germany are located in cities. During the war, both slaughterhouses and laboratories were badly damaged. Since the cessation of fighting, however, repairs have been made, essential facilities and equipment obtained, and the necessary examinations of meat and carcasses are now being conducted in accordance with the German law.

CONCLUSIONS

As building materials, laboratory equipment, and supplies become available, the German veterinary service will provide the country with important scientific knowlege and will improve the efficiency of the German veterinary service. Prominent German veterinary scientists will be given the opportunity to develop new means for assisting in the control of human and animal health and will probably contribute, as they have in the past, answers to many of the problems in the field of medical and veterinary science.

SUMMARY

The veterinary laboratories are an important part of the German veterinary service, whose principal objectives are to conserve livestock resources through control of animal diseases and to protect human health through food hygiene control.

The responsibility of these laboratories covers research, animal disease diagnosis, examination of foods, production of biological products, testing and standardization of biological products, and participation in education and training of veterinarians.

There are now adequate numbers and types of veterinary laboratories in the U.S. Zone.

Despite war damage, shortage of personnel, and lack of equipment, the laboratories are conducting an essential service and are gradually being rehabilitated to assume their former responsibility in providing Germany with an efficient veterinary service.

## Objectives of the National Canine Research Foundation

The National Canine Research Foundation was incorporated Aug. 30, 1946, in New York State, as a national scientific and educational nonprofit organization. A retired state supreme court justice, Townsend Scudder, is chairman of the board, and Anton Rost is president. Headquarters are in New York City.

The stated purpose of the Foundation is "research and education in the interest of dogs." To this end, three projects have been started, as follows:

1) Research on the distemper complex, under Dr. James A. Baker, assisted by Dr. Peter Olafson, at the New York State Veterinary College.

2) Leptospirosis studies, centering on penicillin treatment and immunization, under Dr. Theodor K. Brunner (studying leptospirosis in the U.S. on behalf of the Swiss government) and Dr. K. F. Meyer, at the University of California.

3) Dissemination of facts on nutrition. It is felt that much already is known about the dietary needs of dogs, and that the main problem is to convey the information to owners.

Contributions come from sources interested in dog welfare. Donations are not accepted "from sources which might be interested in special pleading." The goal is to build up a fund of $2 million.

Officials of the organization point out that "The Foundation does not contemplate that it will engage in or aid physiological research, into which term falls vivisection. It is not blind to the benefits which have come through vivisection, but it does not itself propose to engage in work which will require it."—*Am. Kennel Gaz., Aug., 1948.*

*Feed Supply Abundant.*—There is more feed per animal unit in the U.S.A. than at any time in the recent past, owing to a decrease of 10 per cent in the number of livestock.—*From Feedstuffs.*

# Panting in Cattle

## A Sequel to Foot-and-Mouth Disease

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*Izatnagar, India*

INVESTIGATIONS on this condition were begun at the Indian Veterinary Research Institute in 1942, and the results so far obtained are presented in three papers.[11, 12] This paper gives a general account of the disease, particularly from the clinical aspect. Owing to the political situation, the work could not be continued as far as was originally intended.

Although panting is well known in India to many people who deal with cattle, and though it is commonly believed to be an aftereffect of foot-and-mouth disease, its cause has not been established. It is known under various local names: in the south-east Punjab it is called *ghamra* or *ghamar;* in central and western Punjab as *ta* or *tao;* in Sind as *tapi* or *thapi;* in Hyderabad as *nakka rogam* (telegu).

Badly affected cattle are recognized by dyspnea, a long or rough coat, and poor body condition. The respiratory change becomes obvious only in the summer. As the heat of the day increases, the animal becomes progressively dyspneic, even at rest in the shed, and may stand with head down and tongue extruded, panting like a dog and dribbling frothy saliva from the open mouth (fig. 1). At this time, the body temperature may register 104 F.; the pulse rate is accelerated. The animal has an anxious expression and is obviously in distress. If made to walk slowly in the sun, respiration becomes more rapid; as nightfall approaches, the panting slackens. The skin feels abnormally dry and inelastic, and the coat is rough and contains many long hairs (fig. 2), as though the winter coat was not shed in the spring but continued to grow. This appearance of the coat makes the animal conspicuous in the herd. When sent out for grazing during the hot season, the affected animal seeks the shade or, if water is at hand, will stand or sit in it like a buffalo. This interference with grazing may contribute to the unthrifty appearance of animals and to the low milk yield. There seems to be no particular age or sex susceptibility, but European cattle in tropical countries are especially affected; in fact, some believe that indigenous cattle and buffaloes do not suffer from panting. As yet, no cure has been found and symptoms recur each summer. If the cattle are moved to the hills, they remain in apparent good health, but symptoms reappear if they are returned to the plains during the hot season. Apart from moving the animals to cooler surroundings, all that is attempted to keep them in production is restricting exercise, clipping, douching the skin, and providing water for bathing. Quite obviously, the condition arises from a permanent physical defect of heat regulation which, as stated above, is thought to be a result of an attack of foot-and-mouth disease.

Fig. 1—Panter 3, open-mouthed, panting, and dribbling saliva. June, 1942.

From the Indian Veterinary Research Institute, Izatnagar, India.

LITERATURE

References are surprisingly few considering the importance of the condition. Giovanoli[1] mentions its occurrence in the Swiss Alps and the tendency of some affected animals to sit for hours with a doglike attitude to facilitate breathing. Kern[6] also writes of the disease in Switzerland and refers to observations on the subject by Horvath[4] and by Laszlo[5] in Hungary.

There are also indications of its occurrence in Germany and Austria as observed by Jöhnk,[8] in France by Robert,[14] in Italy by Nai,[13] and in Sweden by Magnusson.[9] A full account of the disease, as seen in Belgium, is given by Hamoir[2] who terms it "cardiac asthma," and who refers to observations in Holland by Kuypers.[7] Hamoir states that the symptoms affecting the respiratory organs and skin begin to be noticeable six to eight weeks after disappearance of the foot-and-mouth disease vesicles. The coat is not only long, coarse, and dry, but also dirty from accumulation of scurf. The accelerated respiration is quite superficial but not forced, and there is no cough. The breathlessness may be such as to bring on attacks of asphyxia which may cause the animal to fall down. The pulse is feeble and accelerated (60 or more per min.) even at rest. Auscultation of the chest reveals an increased vesicular murmur suggesting pulmonary emphysema. The heart sounds are practically normal at rest but become arythmic or otherwise altered on exercise. If animals are well cared for, the heart action is likely to improve and they may return to useful work though retaining a rough coat. This is especially true of young animals; in many cases, however, they are slaughtered for economic reasons. Hamoir found postmortem changes, regarded by him as primary, in the walls of the heart, *viz.*, foci of sclerosis perhaps originating as a periarteritis, disintegration of muscle fibers, and changes in the bundles of His. There was also pulmonary emphysema which, however, bore no relation to the degree of dyspnea during life, and, in 1 case, sclerosis of the adrenal cortex. No changes in other endocrine glands are mentioned. In a discussion on Hamoir's communication, Ligniéres pointed out that the condition is quite well known in Argentina, where affected animals are referred to as *asoleados*, since they appear to be affected by the sun. In some years, a large proportion of animals are affected. Ligniéres mentions the rapid abatement of symptoms if the air temperature falls sharply, as after a shower. The condition is chronic, and as the animals grow older, the symptoms become increasingly severe every hot season. Ligniéres and Kuypers believe that foot-and-mouth immune serum, given early in the attack, may reduce the number of affected animals.

In India, the disease was recorded by Shah[16] at Hissar, and the symptoms were ascribed to derangement of the thyroid gland. Stewart[17] has urged the importance of panting among grade Holstein-Friesian cattle at the military farms and the need for reducing losses.

Most of the authors mentioned above are of the view that the condition is one of the complications or sequels of foot-and-mouth disease. Why the complication should appear only in particular animals is not clear; but, according to Giovanoli and Hamoir,[1, 2] the comptication does not necessarily follow unusually severe cases of that disease.

## PANTING IN ANIMALS ON MILITARY FARMS

In 1942, with the assistance of Brigadier J. J. M. Soutar, a questionnaire was circulated to the military farms in various parts of India. Replies were received from North West Frontier Province (Bannu, Dera Ismail Khan), Punjab (Sialkot, Sargodha, Ferozpur, Shadipur, Lahore, Jullundur, Ambala, Multan), Cen-

**TABLE I—Incidence of Panting in Cattle on the Military Farms**

| | Holstein—Friesian | | | Grade | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Indian | Imported | 15/16 or higher | 5/8 | 3/4 | 7/8 | 1/2 | 1/4 | 1/8 | Total European, and crossbred | | Indi-genous |
| Adults | 20 | 24 | 71 | 451 | 713 | 253 | 613 | 205 | 10 | 2360 | | 538 |
| Panters | 5 | 7 | 13 | 64 | 63 | 21 | 28 | 4 | 0 | | 205 | 14 |
| (% of 205) | (2.4) | (3.4) | (6.3) | (31.2) | (30.7) | (10.2) | (13.7) | (2.0) | (0.0) | | | |
| Young stock | 26 | 13 | 125 | 353 | 317 | 84 | 99 | 57 | 3 | 1077 | | 35 |
| Panters | 2 | 0 | 21 | 36 | 14 | 9 | 1 | 0 | 0 | | 83 | 0 |
| (% of 83) | (2.4) | (0.0) | (25.3) | (43.4) | (16.9) | (10.8) | (1.2) | (0.0) | (0.0) | | | |
| Total adults and young stock | 46 | 37 | 196 | 804 | 1030 | 337 | 712 | 262 | 13 | 3437 | | 573 |
| Total panters | 7 | 7 | 34 | 100 | 77 | 30 | 29 | 4 | 0 | | 288 | 14 |
| (% of 288) | (2.4) | (2.4) | (11.8) | (34.7) | (26.7) | (10.4) | (10.1) | (1.4) | (0.0) | | (8.4) | (2.4) |

tral Provinces (Jubbulpur), United Provinces (Agra, Muttra, Meerut, Lucknow, Cawnpore, Allahabad, Jhansi, Dehra Dun), Bombay, (Deolalia, Belgaum, Kirkee, Ahmednagar), and Hyderabad-Deccan (Secunderabad). Apart from Belgaum (2,550 ft.) and Dehra Dun (2,375 ft.), all are less than 2,000 ft. above sea level. At most places, the average maximum temperature exceeds 100 F. The total rainfall varies greatly from farm to farm. In addition, information was obtained from the Imperial Agricultural Research Institute (Delhi) and from a few persons having special knowledge of the subject. A digest of the replies follows.

*Incidence.*—Totals are shown in table 1. On the military farms, apart from some indigenous stock, most of the dairy cows are Holstein-Friesian crosses with Sahiwal, Sindhi, or Hariana; particularly the first two. No panters were reported from Belgaum, while those at Dahra Dun had been sent there from other farms.

Figures in brackets indicate the percentages of animals which were panters. Thus, out of a total of 3,437 European and crossbred stock, 288 (8.4%) were listed as panters and, of these, the great proportion were ¾, or higher, European-bred. Among 573 indigenous stock on these farms, only 14 (2.4%) were panters. Out of 12,363 buffaloes, including an unknown number of young stock, on the military farms, only 2 animals were described as panters.

*Breed and Grade.*—Opinion is in conformity with results in table 1, *viz.*, that the disease is more frequent and more severe in European or crossbred cattle. It occurs more rarely in indigenous cattle. The point is made, however, that many high-grade cows show a rise in temperature and respiration rate in the hot weather but are not true panters. In the report from Sialkot, where many purebred Holstein-Friesians are kept, it is stated that generally all the stock pant when the weather is exceptionally hot, dry, and calm. Of indigenous breeds, the Sahiwal has greater susceptibility.

*Age at Which Panting Appears.*—Many instances are mentioned where the disease is said to have first appeared in adult life. There are also many more instances where animals as young as 4 or 5 months have panted. The opinion from Allahabad is definite that calves do not pant while on milk, *i.e.*, up to about 6 months. After that, panting may develop gradually, but it is always less in animals under 1 year than in older ones. Further, it is stated to be most severe in animals ready for service at about 2 years of age. Incidentally, among adults, dry animals are less affected than those in milk and especially those giving a high yield. The opinion is expressed that the condition becomes more severe after calving.

*Hereditary Transmission.*—The evidence in inconclusive. Sometimes the sire or dam is known to be a panter. In other cases, there are definite statements to the contrary; often no information can be obtained.

Fig. 2—Panter 3 (left) showing rough coat and control (right). March, 1943.

*Breeding Capacity, Milk Yield, and Systemic Changes.*—There is no adverse effect on breeding capacity, though calves from panters may be weak, nor does it cause abortion. As to the milk yield, no conclusive information has been obtained. All stock show a decline in milk yield during the hot months and, as would be expected, this is exaggerated in panters. The milk yield of panters increases in the cool season. It is not clear whether the yield of animals which become panters after an attack of foot-and-mouth disease is really

lower than in animals which pass through an attack without becoming panters. On the other hand, it is known that, at the time of an attack of foot-and-mouth disease, secretion may cease altogether and not reappear in the current lactation.

It is agreed that the body temperature in panters is relatively high during the warmer part of the day in the hot season. This is accompanied by a rise to 80 or 100 in respiration rate and a rise in pulse rate. Bad panters are said to show poor appetite during the hot season, especially during the warmer part of the day; but some say that even severe cases may continue to feed well. Less affected cases appear to feed and ruminate normally. Frequent mention is made of the rough staring coat containing long hairs. Panters are often restless during the heat and have a staring, anxious, expression. Symptoms are more severe in dark-coated animals. Panters consume excessive amounts of water and seek shade; they also seek to lie in mud or water. The condition is usually not severe enough to cause death, though a few cases of death from heat exhaustion are mentioned.

*Relation to Weather.*—The condition is definitely related to high temperature, which appears to be the main factor. Excessive humidity accentuates the condition.

*Relation to Foot-and-Mouth Disease.*—Opinion is divided. A number of reliable observers have cited instances where, especially in high-grade animals, the onset of panting has followed an outbreak of foot-and-mouth disease. At Allahabad, it was believed that panting in the hot season generally follows foot-and-mouth disease but is simply due to debility following an attack of this disease in the previous cold season. On the other hand, there are numerous cases where panting has developed in animals having no record of foot-and-mouth disease. The question will be further considered in the discussion.

*Natural Recovery, Remedial Measures.*—The consensus is that there is no permanent natural recovery. There is temporary recovery with the onset of cold weather and some alleviation when the rains appear. As a preventive measure, back-crossing with indigenous stock is recommended. In developed cases, attempts should be made to keep the body cool; clipping and frequent hosing are useful measures, and where possible, cattle should be transferred to the hills during the hot season. Calving should be planned for the end of the hot season. The skin and coat can be restored by massage and grooming, but attempts to revive milk production have not been successful. Severe cases should be sacrificed.

### Experimental Observations and Pathology

In order to make a close study of the condition, a number of cows reputed to be panters, as well as some normal controls, were moved to the Institute, kept for approximately two years, and then slaughtered for further examination. An account of this work is recorded in the papers by Minett[11] and Mullick.[12] During life, clinical examination was made from time to time (pulse, respiration, body weight, etc.), and the effect of mild exercise was noted. Blood and urine samples were taken for biochemical work, and after death particular attention was paid to certain of the endocrine glands. It was found that the panting condition varied among individuals and that a distinction had to be drawn between true panters and animals which ordinarily feel the heat more than others of the same breed. During the hot damp days of the monsoon season, panters show extreme distress and high respiration rate.

Panters were found to be anemic, to have a lower alkali reserve than controls, and higher values for blood lactic acid and inorganic phosphorus. They showed a higher excretion of urine of relatively low specific gravity, and a lower output of urinary nitrogen and chlorine. They consumed less food and had lower food utilization than control cattle.

Definite lesions were found in the thyroid glands. These were reduced in size and the large colloid-distended vesicles of the normal, resting thyroid were replaced by small vesicles lined by somewhat cuboidal cells and containing little colloid. The reduced size of the gland is regarded as an environmental adaptation, but since the heat production of panters is higher than that of controls, it seems that the panter's thyroid is still too active for the animal's needs. No distinct lesions were seen in the pituitary glands of panters, but the chance that the fundamental defect lies in the pituitary gland should be noted.

In the matter of treatment, very little work has been possible. One very bad panter was put on an iron-copper mixture, the daily dose of 1 fluid ounce containing 3.0 gr. $FeSO_4$ and 0.3 gr. $CuSO_4$. In addition, a daily ration of 6 lb. of green guinea-grass was fed. After one week, the iron mixture was increased 3.5 times. A month of this treatment had no effect on the

general condition. After an interval of three weeks without treatment, this animal was given for one month 1 oz. daily of sodium bicarbonate in the feed, but again without obvious favorable effect.

## DISCUSSION

There seems no doubt that the pathologic condition, commonly known as panting, is far more widespread than might appear from the relatively scanty references in the literature. As mentioned above, it has certainly been recorded in a number of European countries, *viz.*, Belgium, Holland, Sweden, Switzerland, Italy, Hungary, and probably also in Austria and Germany. Its occurrence in South America (Argentina) is also definite, but it is surprising that no references to it have been seen in the abstracts of the various administrative reports of countries of Africa. There is almost universal agreement that the condition is a sequel of foot-and-mouth disease; the fact that the relation between cause and effect is not always evident is no solid argument to the contrary. In India, for instance, the primary affection may occur during the winter and well-marked symptoms of panting may appear only in part of the stock during the following hot weather. Slight attacks may escape notice or not be recorded. In connection with this matter, I have tried to ascertain whether panting has been observed in the United States and Australia, two countries which are free from foot-and-mouth disease. In regard to Australia, Mr. Max Henry[3] writes: "All the men with whom I have made contact express the opinion that such a syndrome as described by you in connection with a condition known as 'panting disease' has not been observed in cattle in the Northern Territory or north of Western Australia. You will understand that some of the symptoms referred to may be seen when travel-weary cattle are moving fast in the hot weather, when an outbreak of pleuropneumonia occurs, and when toward the end of the dry season there is a general condition of emaciation, with rough staring coat." Dr. B. T. Simms, chief of the Bureau of Animal Industry in the United States, has sent the following notes: Dr. H. Schmidt of the Texas Agricultural Experiment Station points out that the symptoms of panting, as outlined by me, are identical with those seen in cattle suffering from vitamin A deficiency. He calls attention to his published article on the subject.[15] Dr. Schmidt does not wish to infer that panting in cattle is due to vitamin A deficiency but merely to indicate that the symptoms in the two conditions are similar. No such symptoms have been observed by him in any other condition. Dr. C. C. Hastings of Williamsville, Ill., also points out the similarity between panting and vitamin A deficiency. Dr. Simms states that, apart from these two references, no information has been received indicating that panting, as seen in India, exists in the United States.

Assuming, therefore, that panting is a complication of foot-and-mouth disease, the question of just why it follows some cases and not others is not clear, but one is faced with a similar problem in other diseases, *e.g.*, rheumatic fever following streptococcus infections in man. Cases of panting certainly vary in their severity, and it is easy to understand that cases which are obvious in hot countries might easily escape notice in temperate ones. Hamoir's observations suggest that, after some outbreaks of foot-and-mouth disease, panters are especially liable to appear; this is perhaps to be explained by special but hitherto undefined tissue affinities of strains of foot-and-mouth virus or perhaps, more likely, by their differing values as antigens.

A further point to be recognized is that cattle, like other livestock, differ in their resistance to heat. A distinction has to be drawn between individuals whose heat tolerance is relatively low and whose respiration rate, in consequence, has to be increased in order to promote heat loss and those individuals which are the subject of this paper, whose inability to support a hot environment is pathologic and appears to arise from some more fundamental defect. The failure to make this distinction may be another reason why the relationship to foot-and-mouth disease is not always clear. The former condition may be simply due to production of thyrotropic hormone in excess of the animal's needs; just as, for instance, the pituitary glands of dairy cows produce more of this hormone than do those of beef cattle, while cows in milk are less tolerant of heat than dry cows for the same reason. In panters, the production of thyrotropic hormone, though reduced in total amount, may still

be relatively higher than the animal's needs, especially during hot weather. There are perhaps two factors concerned in panting—chronic anemia and a defect in the pituitary-thyroid-adrenal mechanism, both factors owing their existence to the virus of foot-and-mouth disease.


## SUMMARY

1) A description is given of the pathologic condition, herein called panting, which, there is strong reason to believe, is sometimes a sequel to foot-and-mouth disease in cattle.

2) The condition is characterized by anemia and dyspnea and is most severe in cattle in hot countries. Affected animals have a long, rough coat. There is evidently a more or less permanent physical failure of heat regulation, due to defective functioning of the endocrine glands.

3) Among crossbred European cattle in India, the condition, though not usually fatal, is a source of greatly reduced productivity. It has also been described in other countries where foot-and-mouth disease is common, even in countries where the prevailing climate is temperate.

4) A questionnaire addressed to the military farms in India revealed that out of 3,437 crossbred cattle, 288 (8.4%) were classed as panters, but the proportion is three or four times this number in animals of three-quarters or higher grade. Of 573 adults of indigenous breed, only 14 (2.4%) were said to be panters. It is questionable if the condition exists in buffaloes.



**References***

[1]Glovanoli, G.: Die Nachkrankheiten der Blasenseuche. Schweizer Arch. f. Tierheilk., *57*, (1915): 382.

[2]Hamoir, J.: L'asthme cardiaque postaphteux. Bull. Soc. Cent. Méd. Vét., *74*, (1921): 409.

[3]Henry, Max: Personal communication.

[4]Horvath, A.: Dampfigkeit nach dem Uberstehen der Maul-und-Klauenseuche. Cited by Kern, *loc. cit.*

[5]Johnk, M.: Uber Nachkrankheiten der Maul-und-Klauenseuche. Tierärztl. Rundschau., *28*, (1922): 683.

[6]Kern, H.: Untersuchungen über die Folgen der Maul-und-Klauenseuche. Schweizer Arch. f. Tierheilk., *63*, (1921): 505.

[7]Kuypers, K. R.: Cited by Kern, *loc. cit.*

[8]Laszlo, S.: Nachkrankheiten im Gefolge der Maul-und-Klauenseuche. Cited by Kern, *loc. cit.*

[9]Magnusson, H.: Skand. Vet. Tidsskr., *29*, (1939): 1155. Abs. in Vet. Bull., *11*, (1941): 89.

[10]Magnusson, H.: Bull. Office Internat. des Epizooties, *19*, (1939): 413. (Original not seen.)

[11]Minett, F. C.: Panting in Cattle—A Sequel to Foot-and-Mouth Disease. I. Experimental Observations and Pathology. Am. J. Vet Res. In press.

[12]Mullick, D. N.: Panting in Cattle—A Sequel to Foot-and-Mouth Disease. I. Biochemical Observations. Am. J. Vet. Res. In press.

[13]Nai, D. D.: Una particolare lesione della ipofisi nella vacca pelosa. Clin. Vet. Milano, *59*, (1936): 355. Abs. in Vet. Bull., *7*, (1937): 628.

[14]Robert, M.: Rev. Vet., *75*, (1923): 290. Abs. in Trop. Vet. Bull., *11*, 107. (Original not seen.)

[15]Schmidt, H.: Vitamin A Deficiencies in Ruminants. Am. J. Vet. Res., *2*, (1941): 373.

[16]Shah, S. M. A.: Ghamra and Its Treatment at the Government Cattle Farm, Hissar. Punjab Vet. J., (Aug. 1948).

[17]Stewart, C. M.: J. Royal Army Vet. Corps, *13*, (1942): 117.


*Owing to insurmountable difficulties in India, Dr. Minett was unable to complete all of his references in accordance with the style of the JOURNAL.

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## A Famous Decade: 1885-1895

The ten-year period overlapping 1890 was the starting point of our Utopian era. Not since Abraham had society experienced a comparable upswing from the work of men in one decade. The way of life of this period was revolutionized because the meager knowledge of microbiology was crystalized, expanded, and put to work in medicine, hygiene, agriculture, and industrial pursuits. "Lest auld acquaintance be forgot," it is good manners to turn the spotlight, from time to time, on the two groups who staged the first act of the great drama, namely:

The House of Pasteur in Paris
The U.S. Bureau of Animal Industry in Washington

To be mentioned *cum laude* in the House of Pasteur, which became the present Pasteur Institute during that decade, are Louis Pasteur and Charles Chamberland, chemists; Emlie Roux and Emlie Ducaux, physicians; Elie Metchnikopf, zoölogist; Edmond Nocard, veterinarian; and Felix Mesnil, biologist. In the American phalanx were D. E. Salmon, veterinary bacteriologist; F. L. Kilbourne and Cooper Curtice, veterinarians; and Theobald Smith, physician and research pathologist, whose combined work demonstrated the infectibility of a tick and its ability to transmit a protozoan infection.

The two groups working independently gave birth to pathogenic bacteriology and entomology. Subsequent research on infectible insects and ticks, antiserums, bacterial vaccines, allergic tests in diagnosis, internal microbicides, and the participation of mic-

roörganisms in the arts and sciences, are but flairs from these ten eventful years.

During the ten years here singled out, the work of Robert Koch on anthrax (1878) and on tuberculosis (1882), and the isolation of *Plasmodium malariae* by Leveran, in 1880, were absorbed by these two groups and put to use.

## Quebec Veterinary School's New Home

École de Médecine Vétérinaire de la Province de Quebec, one of the accredited colleges of veterinary medicine of North America, has been divorced from its long-time sponsor, the University of Montreal and installed in its own home at St. Hyacinthe. Whether the loss of university status will be for better or for worse only time can tell. According to Minister of Agriculture L. Barré (*Canad. J. Comp. Med.*, Feb., 1948), the department of veterinary medicine had become an unwelcome child, kept under protest for several years past. Quoting the Minister: "I had believed that human and veterinary medicine were sisters, but when I spoke to the University of Quebec and the University of Montreal, I was told that the students of the two branches of medicine—human and veterinary—could not live happily together if they saw each other more than once a year, so it was thought better to erect a school where the veterinary students would feel more *chez-eux*."

The episode is veterinary history repeating itself. What Quebec may pass off as but a local storm is in reality a far-reaching flair of the continuous undervaluation of classical veterinary service by the cultured people of agricultural countries. *O tempora, O mores*, and O for the hour when the thing that makes the world tick will be better known—the farm animal.

## The Recession of Malaria in the U.S.A.

Since 1935, malaria receded to an all-time low in the United States. The vast epidemic areas of ague in the nineteenth century have contracted to small, scattered centers along the southeastern seaboard and lower Mississippi lowlands. Although malaria does not plague farm animals, it does plague their keepers. Factually told, malaria control and cattle tick eradication cleared the way for the building of a great livestock empire in the South, and veterinary medicine dotes on the honor of demonstrating the principle of infectible arthropods as the transmitting vehicles.

In rummaging for an answer to the favorable trend of malaria in his article entitled, "What's Happening to Malaria in the U. S. A.?" (*J. Am. Pub. Health A.*, July, 1948), Andrews of the U. S. Public Health Association poses a few questions to ponder, namely:

1) Is malaria being treated out of existence?
2) Has man become generally refractory to the infection?
3) Have infectible anopheles become so few that transmission is not possible?
4) Have these species lost their susceptibility to plasmodial parasitism?
5) Have they lost the taste for human blood?
6) Have rural homes in the South been made more secure against insects?

The participation of these nullifying influences on the recession of malaria in this country is obviously shared among them, but taking the experiences of livestock sanitary science as a criterion, relaxing the organized attempts to make the eradication more complete, as some propose on the grounds of its cost, would seem ill advised since every etiological element concerned still lives in readiness to flare when and where favorable conditions—the susceptible host, the virulent parasite, and the willing vector—are allowed to meet.

*Dr. Menges' Article on Foot-and-Mouth Disease.*—The concluding part of "Cyclic Variations in the Prevalence of Foot-and-Mouth Disease" by Robert W. Menges, D.V.M., which had been scheduled for this issue, will be published in the near future, along with the references. The first part of this article was published in the November JOURNAL.

*Two Billion for Scientific Research.*—At the centennial anniversary of the American Association for the Advancement of Science in Washington, President Truman in his address of welcome suggested that $2 billion be appropriated for scientific research every year.—*Science, September 24.*

For best results with any starter formula, calves should have access to high quality hay.—*Turk, Cornell University.*

## A Modern Animal Hospital

It is now time for the veterinarian to consider building a professional unit in step with modern standards of practice, if an architect may be permitted to express an opinion on this important subject.

A detailed study of veterinary hospitals and clinics indicates that the majority of them are of two types: reconverted store spaces located in congested business blocks, or parts of home dwellings. This is true both in large and small cities in many states of the Middlewest. Only an occasional animal hospital or clinic was built specifically for that purpose and designed in keeping with the modern trends, which include efficient handling of the animals and kennel construction in keeping with recognized psychological and hygienic considerations.

Since the veterinary hospital or clinic constitutes a necessary part of a neighborhood unit, it should be designed not only as a veterinary hospital but as a working unit for a particular veterinarian to meet the needs of one community. Veterinary practice varies widely, depending upon the services required by the clientele and the special techniques developed by the practitioner to supply these services.

The structure pictured is an example of what may be accomplished. It was erected recently for a veterinarian who left a congested area in order to escape the high rentals and to provide parking facilities for his clients. He found that he accomplished not only these two ends, but he also secured facilities which enabled him to render a better and a more complete veterinary service to a larger group. He was able to work more efficiently and more effectively because the size and arrangement of the rooms had been designed and built to meet his specific needs. He soon learned that the distinctive professional atmosphere of the new hospital was appreciated, and that he was building a thriving practice around a group of high class clients.

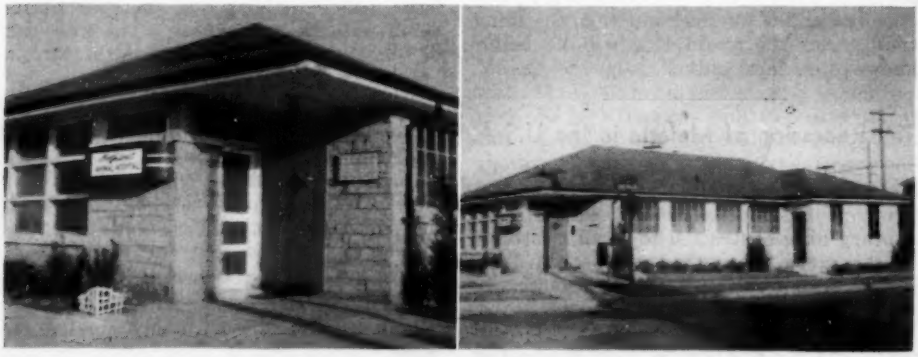
This experience has undoubtedly been duplicated by veterinarians and other professional persons in many communities, and could be repeated almost endlessly by still others who would appreciate and develop the advantages of a well-designed, outwardly attractive, and inwardly efficient hospital or clinic.

This structure was designed to offer an inviting and professional atmosphere by providing a modern layout for a single purpose. The interior incorporates the equipment needed by the practitioner with a room arrangement which permits rapid and efficient use of all space and instruments.

The office is conveniently located with access to the waiting room and the examining room.

The clinic embodies modern animal hospital principles by dividing its services into in-patient and out-patient groups. The in-patient group includes wards for general, for surgical, and for isolation cases.

The pharmacy is situated between two examining rooms, so that two veterinarians may work simultaneously and still have ready access to all of the hospital facilities,—or one examining room may be reserved for the use of in-patients while the other is filling the needs of the out-patients.



Entrance (left) and exterior view of modern animal hospital recently completed.

The surgery and the surgical ward form a self-contained unit apart from the traffic to and from the examining rooms.

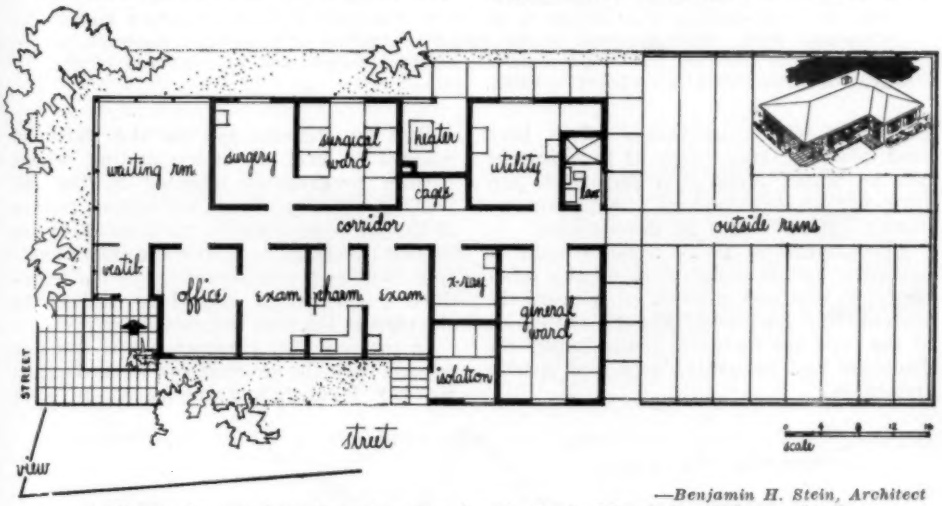
The general ward is located at the back of the building, away from the excitement of the waiting room and readily available to the outside runs. The utility room is also at the back of the building, chiefly for ready access to the general ward.

The isolation ward can be entered only through an outside door; there is no direct access to it from within the hospital. This greatly reduces the hazard of having highly infectious material escape from the isolation ward to the other wards of the hospital.

All cages are in two banks, one level superimposed upon the other. The bottom cages are larger to accomodate larger dogs, while the upper tier is composed of smaller units to permit more effective use of the space available.

The building is complete with an x-ray room and a heater room. The latter houses not only the heating unit, but also the ventilating equipment and an incinerator.

This building, the subject of much favorable comment in its immediate area, should inspire other veterinarians, who contemplate a move or modernization, to undertake a similar project. There are no tricks or shortcuts, so that whatever has been done here can be accomplished elsewhere to meet specific problems and requirements. A qualified architect will design a structure to fit the surroundings and to incorporate the personal preferences of practitioners.—*Benjamin H. Stein, Architect, Chicago, Ill.*




—*Benjamin H. Stein, Architect*

**Architect's drawing of interior and exterior (inset) of animal hospital recently completed.**

## Public Told of Brucellosis Danger

Recognizing the upswing in brucellosis cases as a serious threat to the health of Ohio's rural population, the state medical and veterinary associations have initiated a joint campaign to warn farm people of the dangers and prevention of this disease.

The state medical association's committee on rural health, headed by Dr. Carll S. Mundy, of Toledo, and the state veterinary association's committee on brucellosis, headed by Dr. B. H. Edgington, of Columbus, are dealing with the problems involved. The two associations have issued folders describing their respective phases and setting forth appropriate control measures. The folders will be distributed through county agricultural agents and will be available to home demonstration leaders, farm organizations, 4-H clubs, rural practitioners, teachers, and county health officials for further distribution. A comparable booklet written from the regulatory standpoint is being prepared by Dr. Harry Geyer, chief of the animal industry division of the state department of agriculture, for distribution by veterinarians to livestock owners.

# SURGERY & OBSTETRICS

AND PROBLEMS OF BREEDING

## The Placentome of the Cow

*This is a condensation of an article by Dr. H. E. Kingman, Wyoming Hereford Ranch, Cheyenne, Wyo., which appeared in the* American Journal of Veterinary Research, *9, (April, 1948): 125-130. The original article presents details and case records of the general statements here reviewed.*—EDITOR.

RETAINED fetal membranes, calves born dead, abortion, and failure of implantation can be traced directly to imperfect performance on the part of the placentome during some phase of its development.

The placentome is an organ specific to gestation and is nonexistent at any other time. It is a new growth. It harbors the placenta. It develops through the union of the fetal and maternal tissues under the combined and integrated action of specific influences.

Both the clinician and the biologist have reached a level of understanding where further progress is impeded by the extremely complicated and mysterious nature of the problems involved. As a result, it has become necessary to review the entire anatomy, histology, and physiology of the reproductive system, in regard to which the clinician is the final interpreter.

In the past, the clinician has viewed too superficially the problems of reproduction. He has been unduly influenced by such

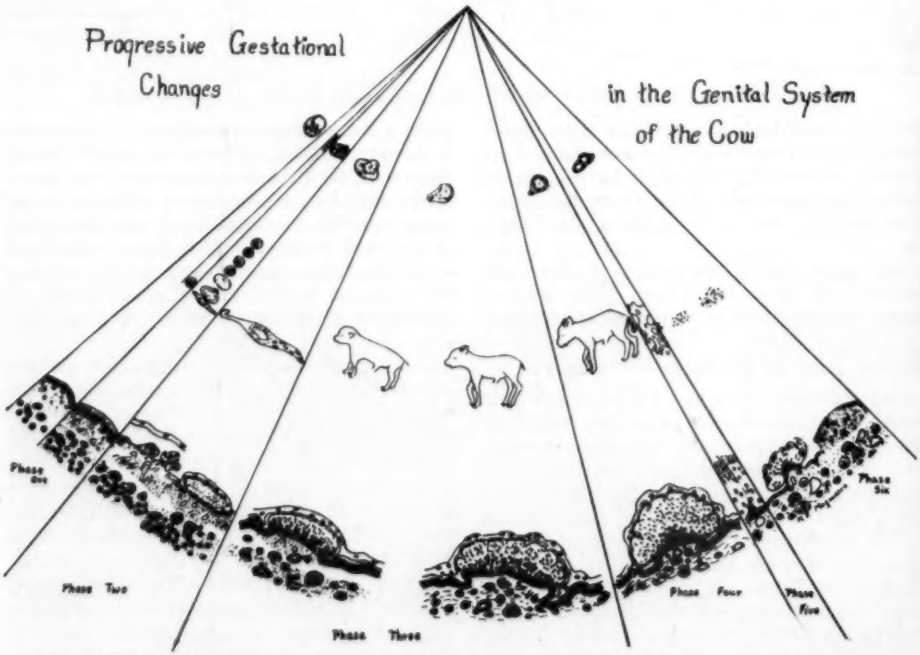



Fig. 1—The six phases of the genital system from the time of estrum through the period of gestation and the return of the genital system to a nongravid state.

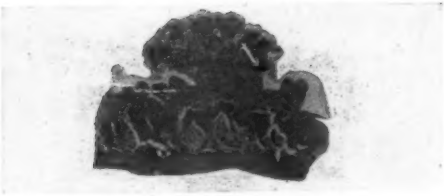


Fig. 2—Phase 1, the preparation of the uterus for implantation, about 50 days.

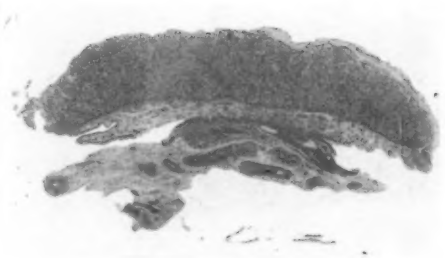


Fig. 3—Phase 3, the period of evolution of the placentome. (Early.)

Fig. 4—Phase 3, the period of evolution of the placentome. (Late.)

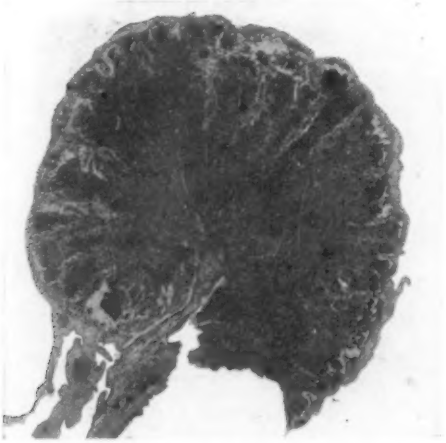


Fig. 5—Phase 6, showing the involutionary, devolutionary, and reparative processes.

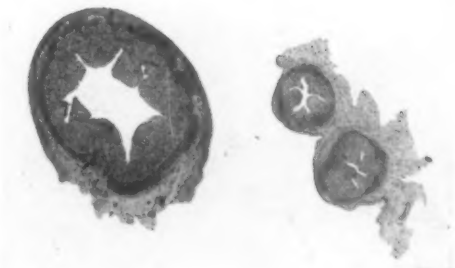


Fig. 6—Uterus (left) of calf 158-45, which was given 160 mg. of stilbesterol over a period of fourteen days. A biopsy of the uterus was obtained two days after the last injection of stilbesterol. At that time, the diameter of the horn, 1 in. from the bifurcation, was 14 mm.

Uterus (right) of calf 159-45, which was given 160 mg. of stilbesterol over a period of eighteen days and slaughtered twenty-seven days following the last injection of stilbesterol. The diamoter of the horn at time of slaughter was 8 mm.

The process of photographing has resulted in an enlargement of almost 2 × (1.93%).

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things as the membranes hanging from a cow or an aborted fetus, when he should have been thinking in terms of the physiology and pathology of the placentome.

On the other hand, the embryologist, the anatomist, the chemist, and the physiologist have been unable to provide the clinician with the answers that, when completed, will be extremely helpful.

## DEVELOPMENT OF THE PLACENTOME

Development and devolution of the placentome is characterized by 6 well-defined phases or periods.

*Phase One.* — Phase one deals with the preparation of the uterus for the reception of the fertilized ovum. It follows estrum and includes the first thirty to fifty days of gestation. Infectious, endocrine, nutritional, and hereditary factors may determine the success or failure of gestation.

The clinician must be thoroughly familiar with, and take cognizance of, the following requisites:

1) A genetically sound sperm must have met an equally complete ovum.
2) United, they must have entered a genital tract that is anatomically and physiologically perfect.
3) Endocrine stimulation and inhibition must have been coördinated.
4) Nutritional support must have been adequate.

*Phase Two.*—Phase two is the period of implantation. It extends from the fiftieth to the ninetieth day of gestation, and is a critical period. It is the stage in which the estrogenic influence is partially relinquished, and the progesteronic influence of the corpus luteum takes over the management of the genital system. The life of the embryo is easily terminated during this phase.

*Phase Three.* — Phase three is the period of evolution of the placentomes. It is a direct continuation of the preceding phases, extending from the ninetieth day of gestation to the 230th day. The first placentomes to develop are in the region of the embryo. Under certain stimuli, the caruncle (a small eminence on the surface of the endometrium) develops to form a placentome. It is a new growth, having no counterpart in the nongravid uterus, and it has many of the characteristics of a tumor.

During phase three, all of the functions that are essential to the growth and development of the fetus are dependent upon coordinated and intricate functions of the placentome.

*Phase Four.* — Phase four is the period in which the genital tract is prepared for parturition, and it extends from the 230th to the 285th day of gestation. The endocrine readjustments essential to this phase are complex and poorly understood. Although attempts to decipher these changes have been made, we know only that they help to cushion the shock of parturition by inciting certain preparatory measures. The corpus luteum plays no part in phase four, while the function of the placenta as an endocrine organ is on the wane, although it apparently is not a senile organ as reported for some species.

Failure to complete the physiologic phenomena are common clinical experiences during the fourth phase. An understanding of the normal conditions is a prerequisite of the recognition of these failures and their prevention and treatment.

*Phase Five.* — Phase five is concomitant with birth, and the function of the placentome comes to an abrupt end. The changes that take place in the placentome during parturition are of utmost importance.

Like all living things, the placenta has an age cycle. The stroma of the villus becomes more cellular and compact as it grows older. The walls of the vessels become thicker and the lumens become narrower. Thus, the fetal placenta slowly ages, and near term, is a senile organ. Its function as an intermediary organ completely ceases at parturition. All of its cells are dead from the time of rupture of the umbilical vessels. The parturient blood clot, which forms in the space which has existed between the walls and the crypts and the fetal villus, governs the release or adherence of fetal and maternal tissues. Hemolysis takes care of the clot that remains in the maternal crypt following parturition, and evidence of this is seen in the sanguineous lochia that follows parturition.

Infections, endocrine stimulations and inhibitions, nutritional provisions and deficiencies, and physical factors presented at the time of parturition determine the course of resolution, involution, separation of fetal and maternal tissues, and devolution of the placentomes.

*Phase Six.* — Phase six is the puerperal phase, from the time the fetus is delivered until the genital tract has returned to nor-

mal. It is made up of a number of concomitant and closely related events that are primarily separative, expulsive, and defensive; secondarily, they are involutionary, devolutionary, and reparative. They take place in an orderly, effective, and integrated pattern that is suddenly accentuated by the initiated birth of the fetus and the rupture of the umbilical vessels.

The clinician must be familiar with the whole complicated series of events. He must be able to recognize the signs that are indicative of failure on the part of any tissue to perform its function effectively. The separation of the fetal villi from the maternal crypts has long been a subject of investigation and speculation. Much misconception exists in regard to it, and the whole problem of separation or lack of it still remains little understood and totally unsolved. Until more is known of the forces involved in union and release, little can be done to affect them one way or another. The placentome is devoid of muscular tissue and therefore is not influenced by oxytocic agents. Devolution can not be hastened; perhaps it can be retarded. Repair can be supported by therapeutic agents such as estrogens, bismuth, and the manual removal of offensive debris.

Involution is seldom at fault. The ability of uterine muscle to respond to stimulation depends upon its condition. In the presence of acute inflammation, it must be allowed to rest. But in mild inflammatory processes, accompanied by relaxation of uterine muscle, stimulation of involution supports other physiologic postpartum phenomena.

### CONCLUSION

Pathologic conditions and clinical diseases occurring during, and peculiar to, these six phases are death and resorption of the fertilized ovum, abortion and birth of dead calves, retained fetal membranes, and puerperal diseases (septicemia, pyometra, etc.).

Clinicians and animal husbandrymen have directed their attention to the superficial phenomena of infertility, abortion, and retained fetal membranes, rather than upon the placentome itself.

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*Adhesive Tape Remover.*—Propylene glycol ethyl ether renders the removal of adhesive tape painless and reduces the traumatic reaction to removal.—*Current Med. Dig., July, 1948.*

## Surgical Reduction of Medial Patella Dislocations

A male Boston Bull Terrier, 7 years old, was brought to my office with a history of several recurrent attacks of medial luxation of the left patella. It appeared that an operation would be unsuccessful because the dislocation, due to a congenital malformation, was of long standing. The leg, immobilized with the help of a Thomas splint for three weeks, gave the dog some relief. However, this procedure proved ineffectual in the long run, and the dog was brought back after several relapses.

Kirk does not recommend surgery in long-standing cases, and reports only "75 per cent recovery if done within a few days of the injury." He further states that the experimental work by Bennett of Harvard corrobates this experience. However, upon the insistence of the owner, an operation was performed.

The Boston Terrier was anesthetized with nembutal, and the area around the stifle was shaved and disinfected. An incision about ½ in. long was made through the skin about ¾ in. above the patella, and about ½ in. medially. A curved, sharp-pointed bistoury was inserted under the skin, and the median ligament severed. The incision was then dusted with urea-sulfonamide powder, and sutured with silk worm. The leg was placed in a Thomas splint for three days, and the dog was kept in the hospital for an additional week before discharged. This animal was brought back for observation at periodic intervals for ten months. No lameness was observed in the operated hind leg but, during this time, the dog developed a noticeable lameness of the right hind leg, again due to medial luxation of the patella. A similar operation was performed on the second leg with complete success. The dog has been observed for the past two and a half years, and has not suffered a relapse on either leg during this time.—*Salo Jonas, D. V. M., New Haven, Conn.*

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It is impossible to determine the true productivity status of a mare through a single examination of the ovaries, because these organs undergo constant changes. These natural changes must be observed over an extended period in order to detect and recognize abnormal changes. —*Major B. F. Trum, V.C., The Blood-Horse, Dec. 20, 1947.*

# Malignant Neoplasm (Lymphoblastoma) of the Liver in a Hog

GEORGE E. BOWLER, D.V.M.
*Ann Arbor, Michigan*

AN AGED sow, weighing about 250 lb., was consigned to the slaughterhouse. In general appearance, it was rough and thin.

Postmortem inspection showed the liver greatly enlarged and filled with neoplasms of various sizes. It weighed 25½ lb. and measured 24 in. across and 19 in. from top to bottom (fig. 1). The liver of a normal hog of this size would weigh about 4 or 5 lb. This liver was also lighter in color than normal.

The only lymph glands involved were the hepatic, a few in the mesenteric chain, and the prepectoral. They were greatly enlarged, pale, and watery. We assumed this neoplasm to be primary in the liver in this case. The carcass was icteric, probably of secondary origin, due to disturbed liver function.

We diagnosed the condition as malignant neoplasm of the liver, with some metastis to nearby lymph glands and, based on our previous experience, believed it to be lymphoblastoma, with secondary icterus.

The carcass was condemned.

The liver was sent to the Department of

Dr. Bowler is city veterinarian, Health Department, Ann Arbor, Mich.

Fig. 1—Enlarged liver showing neoplasms of various sizes.

Pathology, University of Michigan, for microscopic determination and the following report was received.

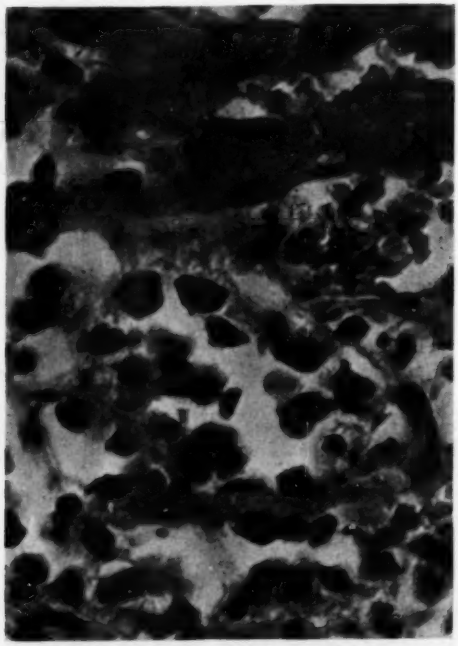

Fig. 2—Liver tissue is shown at the left in the photograph. The neoplastic cells are at the right, appearing as black areas (nuclei) with cytoplasm surrounding them. (Highly magnified.)

MICROSCOPIC PATHOLOGY

This is a malignant neoplasm which is growing in many small and large rounded masses throughout the enlarged liver. The neoplastic cells are polygonal. There is relatively little cytoplasm which is basophilic in its staining reaction. The nuclei are large and vesicular and somewhat hyperchromatic. There are numerous division figures indicating rapid growth. In many areas, the neoplasm cells line thin septums, and some of them have fine processes. Between these structures there are small spaces. This is a lymphoblastoma of reticuloendothelial type. The adjacent liver tissue shows extensive hemorrhage, intense congestion, cloudy swelling, and degenerative fatty infiltration. In addition, there is a well marked obstructive icterus shown by so-called "bile thrombi" in dilated canaliculi.

The entire specimen was displayed in a store window in our city. An appropriate explanation was included which was calculated to further public interest in public health phases of veterinary medicine and also to focus interest on the campaign for control of cancer when such funds are solicited.

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The porcine fetus makes about two-thirds of its growth during the last month of gestation.

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*Acid Vagina in Relation to Sterility.*—Acidity of the vagina has been overstressed as a possible cause of bovine sterility. The only acid vaginas I have seen that might have been injurious to the semen had so much pus in them that nobody should have even considered breeding the cows without first correcting the condition.—*S. A. Asdell, Ph.D., Jersey Bull., Sept. 10, 1948.*

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*Sexual Rest.*—In the study of the etiology of sterility in farm animals—local and general diseases and functional disorder—there is yet to be remembered that animals undergo periods of sexual rest in the absence of abnormality. The low percentages of conceptions to inseminations (natural or artificial) are not entirely pathologic. Anovulation is a physiologic state in mammalian life, and its duration after parturition is not readily computable. When brucellosis, endometritis, pyometra, trichomoniasis, cervico-vaginitis, and aberrant ovaries have been excluded, normal sexual rest remains to be considered in the diagnosis of sterility.

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*Anesthesia of the Bovine Penis.**—The sigmoid flexure was palpated caudal to the scrotum and drawn backward. Fifty to 100 cc. of 1 to 3 per cent novocain was injected around the nerve dorsalis penis in the second bend of the sigmoid flexure. The injection was made from both sides. In bulls older than 5 years, the penis was protruded 20 to 25 cm. in ten to fifteen minutes. Some cases required forty-five to sixty minutes. In young bulls, only the glans was exposed, but the penis was easily withdrawn manually. The penis returned to the prepuce in three hours. Loss of sensation began in the glans and extended to the whole sigmoid flexure. The procedure was used for catheterization and for treatment of trichomoniasis. — *R. E. Habel, D.V.M., Columbus, Ohio.*

*Fatkin, N. F., and Isaev, S. G.: Anesthesia of the Penis in the Bull. Veterinariya, 25, (March, 1948): 24-25.

## Fifth Coagulation Factor

Research men told the International Society of Hematology at a recent meeting in Buffalo, N. Y., that ac-globulin has been identified as the fifth substance necessary for coagulation. The "ac" stands for accelerator, this substance being one of the triggers that sets the clotting process in motion. Four other substances, the research men explained, are also necessary to this process. Prothrombin, a blood protein, must be activated by thromboplastin, a substance present in the tissues, and calcium to form thrombin. Thrombin is the intermediate substance that acts on fibrinogen, the fourth factor. Parahemophilia, a rare blood disease, apparently responds to treatment with ac-globulin, it was reported. —*Sci. News Letter, Sept. 4, 1948.*

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Extending the colostrum-feeding period, by saving that which is not fed to newborn calves, has been shown to produce better gains and physical appearance and greater resistance to digestive and respiratory infections than the feeding of whole milk or skimmilk to calves.

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## Anesthesia of the Equine Perineum*

Regional anesthesia of the area from the anus to the scrotum was obtained by blocking the perineal nerves. The nerves emerge on either side of the anus and run ventrad around the ischial arch to the scrotum. Subcutaneous and deep (subfascial) branches are described. The injections were made one finger's breadth dorsal to the ischial arch and an equal distance lateral to the anus. Five cc. of 3 per cent novocain was injected subcutaneously, after which the needle was inserted another 0.5 cm. to deposit 5 cc. about the deep branch of the nerve. Anesthesia was adequate for urethrotomy in ten minutes and lasted two hours. If deeper anesthesia was desired, as for protrusion of the penis in catheterization, the pudendal nerves were blocked. This was accomplished from one of the perineal nerve injection points. The needle was advanced toward the midline until it struck the ischial arch, where 10 to 20 cc. of anesthetic was deposited.—*R. E. Habel, D.V.M., Columbus, Ohio.*

*Magda, I. I.: Local Anesthesia in Operations on the Male Perineum in Horses. Veterinariya, 25, (July, 1948): 34-36.

## Tetanus Anatoxin Curative

Large doses of tetanus toxoid (anatoxin) give more favorable results in the treatment of acute tetanus (human) than was ever obtained from tetanus antitoxin, according to case reports published from time to time in medical literature. In a recent case (*Biol. Abstr.*, Sec. C., Feb., 1948), cured in seventeen days, the dosage was: first day, 2 cc.; second day, 3 cc.; fourth day, 2 cc.; eighth day, 3 cc. The period of incubation being less than ten days, the infection was not benign. Antitoxin intravenously was not given concomitantly as recommended by Ramon, because none was available.

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## Liver Biopsy*

A method of liver biopsy for histologic diagnosis of equine infectious anemia is described. A sharp trocar 29 cm. long, fitted with a stylet and a long narrow flexible knife, was inserted in the right thirteenth intercostal space at the level of the tuber coxae. The lung was penetrated, and the aponeurotic part of the diaphragm was recognized by a scratching sensation. The trocar was advanced another 2 to 3 cm. to penetrate the diaphragm and the capsule of the liver. The stylet was withdrawn and the trocar driven 3 to 4 cm. into the parenchyma by a sharp thrust. The tissue was excised with the knife and the trocar withdrawn. Better results were obtained if the animal was standing with the hindquarters high. The added pressure of the gastrointestinal tract was thought to fix the liver against the diaphragm.

Of 212 biopsies performed upon 176 horses, there were 3 fatal complications: 2 cases of hemorrhage and 1 of purulent pleuritis. Autopsy of 13 animals at varying intervals after biopsy indicated that hemorrhage was inevitable, but limited to 70 to 100 cc., and absorbed in three days. The defects in the lung and liver were healed in ten to sixteen days. Biopsy results were in 80 to 90 per cent agreement with clinical and postmortem diagnoses. The method is recommended for early diagnosis of chronic infectious anemia.—*R. E. Habel, D.V.M., Columbus, Ohio.*

*Col. D. I. Roshnov: Biopsy of the Liver in the Diagnosis of Infectious Anemia of Horses. Veterinariya, 25, (July, 1948): 16-19.

# CLINICAL DATA

## Clinical Notes

Sulfonamides have no curative value in virus diseases of poultry.—*Delaplane at the AVMA meeting.*

*Insecticides.* — The use of drugs and chemicals to kill insects should in no degree whatsoever replace the destruction of their breeding places.

Nicotinic acid deficiency *(J. Nutr., Sept., 1948)* can be prevented in pigs fed a low-protein ration composed mainly of corn by supplementation with synthetic tryptophane, Michigan State College studies showed.

*Therapeutic Paradox.* — For reasons largely unexplained, both dicoumarol and vitamin K give favorable results in acute coronary artery occlusion, notwithstanding that they have opposite effects on the blood — the former retarding coagulation, the latter aiding the process. — *Med. Times, September, 1948.*

In tests at the Hormel Institute, sows and gilts that received "a touch of blue vitriol" (copper sulfate) in their feed averaged 1 more pig per litter than those deprived of it, and pigs dosed with it gained 10 to 15 per cent faster. The suggested feeding method for breeding stock is to mix 0.5 lb. of copper sulfate with 100 lb. of mineral, or 0.25 lb. with 200 lb. of concentrate.

*Chemical Caponizing.*—The use of stilbestrol, implanted as pellets under the skin, in oil intramuscularly and/or *per os* in aqueous solution, gave good results in a flock of Leghorn cockerels. They gained weight and fattened rapidly and showed no untoward results from the treatment. Stilbestrol-treated cockerels left with the flock, however, are victims of their more belligerent congeners, having lost their aggressive instinct.—*Rec. Méd. Vét., September, 1948.*

Abortion in the early weeks of gestation should arouse suspicion of trichomoniasis.

Some of the difficulties, including shock, following intravenous or intraperitoneal injections are traceable to the use of excessive concentrations, given too rapidly and not warmed to body temperature.

*BCG in Veterinary Practice.*—The First International BCG Conference, held at the Pasteur Institute in Paris, reported that the use of BCG vaccine in cattle prevents the extension of tuberculosis even in herds showing a high percentage of tuberculous animals.

*Scapular Paralysis (Sweeny).* — The benefit derived from stimulating liniments and irritants to the atrophied muscles of subscapular nerve paralysis of horses is exactly nil. The injury is remote from the site of the applications. Partial recovery ensues slowly when and if the injured nerve trunk regenerates.

A kaolin quaternary ammonium adsorbate has given excellent results in bovine granular vaginitis. This treatment, coupled with the topical use of an estrogenic substance, not only arrests the infection, but also induces more rapid epithelial recovery. —*Dr. J. W. Cunkelman before the Pennsylvania V.M.A.*

*Food-Borne Infections.*—The U.S. Public Health Service reports that in 1946 there were 229 outbreaks of disease from contaminated food, which involved 12,526 persons and caused 17 deaths. Unsanitary conditions and infection from handlers were the chief causes. An important development is that milk-borne and water-borne diseases have declined while the food-borne ones have increased. That these are but a fraction of the persons sickened by substandard food is self-evident.

# The Effect of Subcutaneous Injections of Benzoquinone (Koch Treatment) on Staphylococcus Aureus Infection of the Bovine Mammary Gland

O. W. SCHALM, D.V.M., Ph.D.
*Berkeley, California*

THESE preliminary observations on the use of benzoquinone* in the treatment of *Staphylococcus aureus* infection of the bovine mammary gland are presented at this time because of recent publicity given the so-called "Koch treatment." The hypothesis upon which this approach to the treatment of disease is based was described in an editorial which appeared in the September, 1948, issue of the JOURNAL, pp. 220-223.

The method, as applied to animals, is a subcutaneous or intramuscular injection of the contents of an ampule (about 10 cc.) which contains one part of the active principle in very dilute solution. The active principle consists of certain aliphatic or cyclic organic compounds containing one or more carbonyl groups. Benzoquinone and glyoxylide are examples of such compounds.

Promoters of the Koch treatment in veterinary medicine base their claims for therapeutic value on the hypothesis that the injection of a minute quantity of the active principle leads to clinical improvement by catalyzing the oxidation of toxins produced by pathogens. They state that the persistence of the specific pathogen in the body after treatment is of little or no consequence, since toxins elaborated by the organisms will be rendered innoccuous by oxidation as a result of the catalyzing activity of the active principle supplied in the Koch treatment. It should be understood that this approach to the treatment of animal disease is based entirely on theory; no scientifically valid facts to substantiate the claims have been presented.

The writer was supplied with ampules, each containing 10 cc. of one part of benzoquinone in 1,000,000 parts of distilled water, for use in an investigation on bovine mastitis. The material was employed in a dairy herd which had been under the continuous observation of the writer for the past five years.

Since *Staph. aureus* infections of the udder were receiving special study in the herd, it was decided to select for treatment 10 cows which had been shedding this pathogen from one or more quarters for variable periods of time. Cows which had been shedding *Staph. aureus* in the milk for as short a period as one week to as long as seven months were included in the trial.

## METHODS

*Staph. aureus* was demonstrated in the milk from individual quarters by dipping a sterile bacteriologic loop into milk (Hotis test sample) which had been incubated for sixteen to twenty hours at 37 C. The content of the loop was streaked on the surface of a veal infusion agar plate containing about 7 per cent fresh cow's blood. The streaked plates were incubated for twenty-four hours and then observed for toxicogenic Staphylococcus colonies. Pure cultures were established by single colony isolations from each milk sample containing toxicogenic Staphylococci. Such cultures were tested for ability to coagulate rabbit plasma. A quarter was regarded as infected with *Staph. aureus* if Staphylococci which were both toxicogenic and coagulate-positive were present in the milk.

All of the specifications regarding use of the product were rigidly adhered to. This included using syringes and needles which had been sterilized by moist heat, filling the syringes in a well-ventilated room, protecting the contents of the ampule from direct sunlight, and making the subcutaneous injections without previous application of a disinfectant to the skin.

## RESULTS

The data on the 10 cows treated with benzoquinone are summarized in table 1. It will be noted that 2 cows, which had shed *Staph. aureus* from a total of five quarters for only one week, were given one injection of benzoquinone; 4 cows, which had shed

From the Veterinary Science Department, University of California, Berkeley, Calif.

*The benzoquinone was supplied by the Animal Research Laboratories, San Diego, Calif., under the trade name KC-49.

*Staph. aureus* from a total of six quarters for from two to ten weeks, were given two injections twenty-four hours apart; and 4 cows, which had shed *Staph. aureus* from a total of seven quarters for from four weeks to seven months, were given three subcutaneous injections of benzoquinone at 24-hour intervals. Individual quarter samples of milk were collected for bacteriologic study at one week, three weeks, and six weeks after treatment. Eighteen infected quarters were involved in the trial. Twelve of the quarters continued to shed *Staph. aureus* without interruption throughout the six weeks.

At the last routine test, made at the end of the sixth week after treatment, 14 of the 18 quarters were still shedding *Staph. aureus* in the milk. The trial was officially terminated after six weeks so that certain cows that had remained infected and were approaching the end of lactation could be dried-off and treated with penicillin. However, 1 such animal (cow 1275) was retreated with three doses of benzoquinone while dry. This cow freshened again still infected with *Staph. aureus* and remained infected throughout that lactation period.

Six of the 18 quarters (cows 963, 1161, and 1657 LF) which were shedding *Staph. aureus* prior to use of the benzoquinone ceased to shed the organism either during the first six weeks after treatment or shortly thereafter. However, inspection of

**TABLE I—The Effect of Subcutaneous Injections of 10 cc. of One Part in 1,000,000 of Benzoquinone upon Staphylococcus Aureus Infection of the Bovine Mammary Gland**

| Cow | Number of subcutaneous injections of benzoquinone | Qtr. | Duration of infection prior to treatment | Results of tests for presence* of *Staph. aureus* in incubated milk samples following treatment | | | Subsequent observations |
|---|---|---|---|---|---|---|---|
| | | | | 1 week | 3 weeks | 6 weeks | |
| 963 | 1 | RF | 1 week | + | + | — | 3 composite samples during next 8 months were negative. |
| | | RR | 1 week | + | — | — | |
| | | LR | 1 week | — | — | — | |
| 1161 | 1 | RF | 1 week | + | + | + | 5 composite samples during next 7 months were negative. |
| | | LR | 1 week | — | + | + | |
| 1657 | 2 | RR | 2 weeks | + | + | + | RR and LR remained infected during next 8 months (12 tests made). |
| | | LF | 2 weeks | + | — | — | |
| | | LR | 4 weeks | + | + | + | |
| 1029 | 2 | LF | 4 weeks | + | + | + | *Staph. aureus* persisted during succeeding 3 months and then disappeared. |
| 1734 | 2 | RR | 6 weeks | — | + | + | Cow dried-off and treated with penicillin. |
| 1420 | 2 | LR | 10 weeks | + | + | + | *Staph. aureus* persisted during succeeding 14 months (12 tests made). |
| 1475 | 3 | RR | 4 weeks | + | + | + | Removed from observation after sixth week. |
| | | LR | 4 weeks | + | + | + | |
| 1275 | 3 | RR | 4 months | + | + | + | Dried-off and retreated 3 times with benzoquinone while dry. Both quarters remained infected throughout subsequent lactation. |
| | | LR | 4 months | + | + | + | |
| 1674 | 3 | RR | 6 months | + | + | + | Both quarters remained infected another month then dried-off and treated with penicillin. |
| | | LF | 4 months | + | + | + | |
| 1588 | 3 | LR | 7 months | + | + | + | Dried-off and treated with penicillin. |

*+ = *Staph. aureus* present in sample. — = *Staph. aureus* not present in sample.

the data in the table reveals that *Staph. aureus* had been found in the milk from these six quarters for only one or two weeks prior to treatment. In contrast, only one quarter (cow 1029) became negative for *Staph. aureus* among the remaining 12 quarters in which the pathogen had been present for a month or longer prior to treatment.

### CONCLUSIONS

Although these observations are limited they do indicate that the subcutaneous injection of benzoquinone is not an efficacious method of treatment for the removal of established infections of *Staphylococcus aureus* from the bovine udder. No evidence is at hand which would suggest that permanent benefit can be anticipated from the treatment of bovine mastitis with drugs which fail to remove specific infectious agents from the udder.

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*Scabies Treatment.*—Satisfactory results were obtained with a combination of benzyl benzoate and tyrothricin in 69 out of 71 cases of human scabies, most of which were complicated by a superimposed pyogenic dermatitis. Itching was controlled rapidly, and no characteristic scabies lesions were present after the fourth day of treatment.—*Cur. M. Dig., Feb., 1948.*

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Biological products that have become outdated or deteriorated through nonrefrigeration are subject to seizure by the Food and Drug Administration under the Miller amendment of the federal law governing its power. Such products on the shelves of wholesalers, retailers, veterinarians, or farm bureaus are adulterated within the meaning of the law.

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*Against Penicillin Ointments.*—Increasing use of penicillin ointments poses the danger of sensitization in over 10 per cent of treated patients. Besides causing local reactions, such therapy may sensitize the patient to parenteral injections of the drug, interfere with bacterial susceptibility, and produce polysensitivity to other bactericides and chemicals. Moreover, there are few indications for topical penicillin. Superficial epidermal infections sometimes respond, but not the deeper ones.—*Current M. Digest, Aug., 1948.*

## Hound with Porcupine Quills

Late one evening, a coon dog was brought in after a battle with a porcupine. Hundreds of quills protruded from the head, legs, neck, and chest causing great discomfort and pain. Nembutal was administered immediately, and careful examination showed numerous quills embedded in the tongue and gums, while many were lodged in the flesh, and could be palpated under the skin. The length of the quills varied from 1 in. to 3½ in., the dermal point, two-thirds white, ending in a short sharp dart, while the outside end had a long dark brown point narrowing to a fine dart.

The majority of the quills were easily removed, but some were lodged very deeply, penetrating almost completely through the tongue and lips. Great care had to be taken in extraction. Each quill was grasped with forceps a little below the black line of the point, where the quill is somewhat softer and more elastic, and the pull was kept steady and straight to avoid breaking. Quills embedded in the flesh were removed by lancing the skin, and extracting with hemostats. Great care also was exercised while palpating for quills, as the embedded ones have a tendency to penetrate deeper into muscular tissue. Before incision, the area was shaved and disinfected, and after extraction, was dusted with a mixture of crystals (80% urea, 15% sulfanilamide, and 5% sulfathiazole). This mixture is very effective in all kinds of wounds and lacerations.

The operation lasted more than two hours, during which time 319 quills were removed. I expected the hound to be sick and lame the next morning, but was surprised to find him on his feet and finishing a large bowl of milk. Two days later, the hound was discharged sound, full of spirit, and ready for another encounter. — *Salo Jonas, D. V. M., New Haven, Conn.*

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*Dilantin Sodium in Canine Epilepsy.*—The antiepileptic sedative, dilantin sodium, can justifiably be tried in all cases of fits in dogs, 0.5 to 1.5 gr. daily being the dose for the average size dog, according to Dr. F. R. Booth *(M.S.C. Vet.,* Summer, 1948). Convulsions due to infectious diseases may not respond, but it is highly effective in relieving the symptoms of true canine epilepsy.

# Vaccination of Pigs with Brucella Abortus Vaccine Strain 19

H. C. H. KERNKAMP, D.V.M., M.S., and M. H. ROEPKE, Ph.D.
*St. Paul, Minnesota*

CONFLICTING reports appear in the literature on the value of *Brucella abortus* vaccine strain 19 for increasing the resistance of swine against infection to *Brucella suis*. Holm, Ardrey, and Beeso[1] described results of preliminary studies of this problem in which it appeared that the resistance was increased in a high proportion (88.8%) of the vaccinated swine. Their appraisal of resistance was based chiefly on the failure of the vaccinated sows to abort premature fetuses or to farrow stillborn and/or weak pigs at term. These animals were artificially exposed to a heavy inoculum (10 million organisms) of viable *Br. suis*. Control or nonvaccinated sows were challenged in the same manner with the result that 77.8 per cent of them either aborted or gave birth to dead and/or weak pigs. Manthei,[2] on the other hand, concludes from experiments designed to test the resistance of vaccinated *versus* nonvaccinated swine, to *Br. suis*, that *Br. abortus* vaccine strain 19 had little or no value as an immunizing agent against this infection. He found that an infection rate, based on the recovery of the organisms at the time of parturition and autopsy, was 66.6 per cent for the principals and 45.4 per cent for the controls. Artificial exposure, using viable *Br. suis* organisms, was the method of challenge employed. Considering that the experimental procedures were essentially the same in both these investigations, the results are very different.

This paper reports the results subsequent to vaccination with *Br. abortus* vaccine strain 19 on a group of pigs that were being reared under natural or field conditions, and on a farm where brucellosis existed for several years. A comparable group of nonvaccinated pigs mingled with those vaccinated, which provided adequate controls.

The herd in which the study was made was located at one of the state's penal institutions. Our first contact with the herd was to determine its status with respect to swine brucellosis. At that time, it consisted of 51 brood sows and 2 boars, all of approximately 18 months of age; 206 gilts and barrows and 2 boars between 7 and 9 months of age. An agglutination test, using *Br. abortus* antigen, was made on the blood serum of each of these animals. Of the swine in the older group, 3.6 per cent showed the presence of agglutinins in the 1:200 dilution, 27.2 per cent in the 1:100 dilution, 27.2 per cent in the 1:50 dilution, 25.4 per cent in the 1:25 dilution, and 16.3 per cent were negative. The results on those in the younger group were 22.3 per cent positive at 1:200, 13.5 per cent at 1:100, 5.5 per cent at 1:50, 9.3 per cent at 1:25, and 49.2 per cent were negative. These results indicate quite conclusively that brucellosis was widespread among the swine population on that farm.

Methods and procedures directed toward the control and eradication of brucellosis from the herd were discussed with the persons responsible for the management of the herd. These included test and slaughter, test and segregation, and a complete herd replacement. Circumstances were such that none of these control programs could be put into operation at that time. In fact, the only effort that was made toward decreasing the extent of the disease was that the gilts which were to be retained for breeding purposes were selected from among those which were negative to the agglutination test.

Our second contact with this herd occurred about eight months later. At this time, it was learned that some of the gilts which had been retained for breeding had aborted but, on the whole, the pig crop was quite satisfactory. At this time, a vaccination program was suggested. It was agreed that one-half of the present pig crop would receive the vaccine and the other one-half would not. It was further agreed that the vaccinated group should occupy the same houses and pastures and receive the same care as the nonvaccinated group.

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In coöperation with the Bureau of Animal Industry, Agricultural Research Administration, United States Department of Agriculture.
Division of Veterinary Medicine, Minnesota Agricultural Experiment Station, University Farm, St. Paul.

Since each pig was suitably identified, a record of its treatment and performance could be obtained. In fact, the records of the vaccinated and the nonvaccinated pigs were retained by us. This prevented any bias on the part of the superintendent and herdsman when it came to the matter of selecting brood stock for producing the next generation.

There were 170 pigs in the entire group. They ranged from 8 to 12 weeks of age. Eighty-nine received 5 cc. of *Br. abortus* vaccine strain 19, and 81 were left as controls. The vaccine proved to be viable when seeded on suitable culture medium. Of the principals, 22 were approximately 8 weeks old when vaccinated, 18 were approximately 10 weeks old, and 49 approximately 12 weeks old. The control group contained 21 of the 8-week old pigs, 32 of the 10-week old pigs, and 28 of the 12-week old pigs.

It is unfortunate that a sample of blood for agglutination testing was not obtained from each of the pigs at the time the vaccine was administered. However, a sampling was made of representatives in each age group and the results of the testing are shown in table 1. Two pigs in the 12-week old control group showed agglutinin titers of 1:100 and 3 of the 10-week old pigs in the same group had titers of 1:50. It is probable that pigs with similar titers were among the vaccinates. These agglutination test results were not known when the vaccination was performed.

A test of all the pigs—principals and controls—was made six weeks following vaccination. The results are shown in table 1. Approximately 18 per cent of the principals (all age groups combined) were negative in all dilutions; 29 per cent had a maximum titer of 1:25; 27 per cent a maximum at 1:50; 20 per cent a maximum at 1:100; and 6 per cent a maximum at 1:200 or above. We feel that if tests had been made a week or two following the vaccination a greater percentage of the vaccinated groups would have shown agglutinins in the higher dilutions. In fact, from other studies at this station (unpublished), in which the postvaccinal titer was obtained each week on a series of pigs of approximately the same age as those in this experiment, the average maximal agglutinin response occurred the first week and it declined rapidly each of the following four weeks. The average maximum at the end of the first week was 1:700 and four weeks later it was 1:35.

A second postvaccinal agglutination test was made on 51 of the principals and 29 controls five months (20 weeks) following the vaccination. The results are shown in table 1. Subsequent to this test, all animals showing a titer of 1:50 or higher were removed and placed in the feedlot and from the remainder, 35 were selected for breeding. Of these, 18 had been vaccinated and 17 had not. The next visit to the herd was not until five weeks after the farrowing

TABLE 1—Number and Per Cent of Pigs in Various Age Groups with Specific Agglutination End-Titers Before and After Vaccination

**Principals**

| Serum-Antigen dilution and end-titers | | | | Prevaccination age in weeks | | | | | | First postvaccination test age in weeks | | | | | | Second Postvaccination test age in weeks | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 8 | | 10 | | 12 | | 14 | | 16 | | 18 | | 28 | | 30 | | 32 | |
| 1:25 | 1:50 | 1:100 | 1:200 | No. | Per cent | No. | Per cent | No. | Per cent | No. | Per cent | No. | Per cent | No. | Per cent | No. | Per cent | No. | Per cent | No. | Per cent |
| — | — | — | — | 5 | 83.3 | 4 | 80.0 | 10 | 62.5 | 7 | 31.8 | 5 | 27.7 | 4 | 8.1 | 6 | 75.0 | 1 | 100.0 | 8 | 19.0 |
| + | — | — | — | 1 | 16.6 | 1 | 20.0 | 6 | 37.5 | 8 | 36.3 | 9 | 50.0 | 9 | 18.3 | 1 | 12.5 | 0 | 0 | 14 | 33.3 |
| + | + | — | — | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 22.7 | 3 | 16.6 | 16 | 32.6 | 1 | 12.5 | 0 | 0 | 12 | 28.5 |
| + | + | + | — | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 9.0 | 1 | 5.5 | 15 | 30.6 | 0 | 0 | 0 | 0 | 5 | 11.9 |
| + | + | + | + | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 10.2 | 0 | 0 | 0 | 0 | 3 | 7.1 |
| Total No. ..... | | | | 6 | 0 | 5 | 0 | 16 | 0 | 22 | 0 | 18 | 0 | 49 | 0 | 8 | 0 | 1 | 0 | 42 | 0 |

**Controls**

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | — | — | — | 4 | 80.0 | 11 | 68.7 | 3 | 50.0 | 20 | 95.2 | 28 | 87.5 | 20 | 71.4 | 8 | 100 | 1 | 100.0 | 15 | 75.0 |
| + | — | — | — | 1 | 20.0 | 2 | 12.5 | 1 | 16.2 | 1 | 4.7 | 3 | 9.3 | 5 | 17.8 | 0 | 0 | 0 | 0 | 2 | 10.0 |
| + | + | — | — | 0 | 0 | 3 | 18.7 | 0 | 0 | 0 | 0 | 1 | 3.1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 10.0 |
| + | + | + | — | 0 | 0 | 0 | 0 | 2 | 33.3 | 0 | 0 | 0 | 0 | 1 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 |
| + | + | + | + | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 7.1 | 0 | 0 | 0 | 0 | 1 | 5.0 |
| Total No. ..... | | | | 5 | 0 | 16 | 0 | 6 | 0 | 21 | 0 | 32 | 0 | 28 | 0 | 8 | 0 | 1 | 0 | 20 | 0 |

season. The farrowing records when compared with our data showed that 6 (33.3%) of the vaccinated gilts farrowed normal litters, whereas, of the remaining 12 (66.6%), 6 had been observed to abort and 6 either failed to conceive or had unobserved abortions. Among the nonvaccinated pigs, 4 (23.5%) farrowed normally and of the remaining 13 (76.5%), 2 were known to have aborted and 11 either failed to conceive or had unobserved abortions. An agglutination test made at this time on the 12 principals and the 13 controls that did not farrow normal litters showed a majority with high titers in both groups (table 2).

TABLE 2—Postparturient Agglutination Titers on the Gilts in Which Observed or Unobserved Abortions Had Occurred or the Gilts Had Failed to Conceive

| Serum-antigen dilution and end-titers | | | | Gilts showing specific titers (No.) | |
|---|---|---|---|---|---|
| 1:25 | 1:50 | 1:100 | 1:200 | Vaccinated group | Control group |
| — | — | — | — | 1 | 1 |
| + | — | — | — | 1 | 2 |
| + | + | — | — | 0 | 0 |
| + | + | + | — | 0 | 2 |
| + | + | + | + | 10 | 8 |

At the time the second postvaccinal or prebreeding agglutination test was made on the gilts in the experimental group, a test was also made on the older breeding females. There were 57 in this group and they were kept in a lot adjoining the one in which the gilts were maintained. Of these, 36 (63.0%) showed positive agglutination in the 1:50 dilution or higher. We consider this to be the source of infection for the experimental group. At no time did the test indicate the presence of infection in any of the males used for breeding purposes.

## DISCUSSION

The divergent results on the effectiveness of *Brucella abortus* strain 19 vaccine as an agent for increasing the resistance of swine against the porcine type of brucellosis as shown in these investigations are striking. Aside from differences in the animals themselves, an analysis of the methods and procedures followed in the prosecution of these studies fails to disclose factors that appear to be sufficiently different to account for the variance. The ages of the pigs in the Idaho[1] and Minnesota studies were similar. The oldest pigs treated were approximately 12 to 13 weeks when the vaccine was administered. In the studies reported by the BAI[2], the pigs were between 16 and 20 weeks of age when vaccinated. A significant proportion of the latter proved susceptible when challenged. If the age of the animal at the time of vaccination is important, then in our opinion, pigs vaccinated when 16 weeks old or over should develop and manifest a greater degree of resistance than pigs vaccinated when 8 to 10 weeks of age. This, at least, appears to be the case for the agglutinins since, as a rule, the postvaccinal agglutinin titer rises to higher levels in pigs that are 12 weeks old when vaccinated than in those only 8 weeks of age. In this connection, the Idaho workers report an average peak agglutinin titer of 1:25 twenty-one days following vaccination for the pigs 8 to 9 weeks old when vaccinated, 1:80 for those 10 to 14 weeks old when vaccinated, and 1:125 for those over 14 weeks of age when vaccinated. In our studies, the average titers six weeks following vaccination were 1:29 for pigs 8 weeks of age when vaccinated, 1:26 for those 10 weeks of age when vaccinated, and 1:72 for those 12 weeks of age when vaccinated. No doubt in both the Idaho and Minnesota studies, these titers represent a recession from a preëxisting higher titer. Moreover, they indicate that the vaccine provoked a greater agglutinin response in the older pigs.

In both the Idaho and BAI studies, the vaccinated and control pigs were challenged with viable *Brucella suis* organisms administered artificially. The Idaho workers exposed the pigs soon after a successful conception, whereas, in the BAI experiments, the challenge dose was administered about two months following conception. It is doubtful whether this difference in time, four to five weeks, accounts for the difference in the results. We cannot be sure when the exposure occurred in the cases herein reported, but it appears that some of the gilts became infected either shortly before or shortly after the mating. This deduction is based on the fact that some of the principals and also some of the controls aborted within forty days after the mating. Others did not abort until close to the time of a normal termination of the pregnancy.

The failure of swine to develop a re-

sistance to *Br. suis* through vaccination with *Br. abortus* should not be unexpected. While these two species of brucella organisms have some characteristics in common, they also have distinct differences.[3] In addition to differences in $CO_2$ tension, in growth behavior toward anilin dyes, and in nitrogen and glucose metabolism, it also appears that there are immunogenic differences. In our experience, and from the results reported by Manthei, the *Br. abortus* vaccine strain 19 did not provoke, in swine, the substance or substances necessary to increase significantly their resistance against the porcine type of brucellosis.

**References**

[1]Holm, G. C., Ardrey, W. B., and Beeso, W. A.: A Vaccination Program for the Control of Swine Brucellosis. Proc. U. S. Livestock Sanitary A., 1945: 191-196.

[2]Manthei, C. A.: Swine Brucellosis. Am. J. Vet. Res., 9, 1948): 40-45.

[3]Huddleson, I. F.: Brucellosis in Man and Animals. The Commonwealth Fund, N. Y., 1939.

*Manganese Treatment of Brucellosis.*—Injection of radioactive colloidal manganese solution is a new treatment for brucellosis that offers promise in limited trials in man *(Vitamineral News)*. A combination of manganese, copper, cobalt, and potassium iodide (in liquid form or capsule) was also used.

## Penicillin Aggravated Tuberculosis Infection

In experimental trials in guinea pigs, penicillin accelerated the action of *Mycobacterium tuberculosis.** Three series of 10 guinea pigs each were inoculated subcutaneously with 0.002 mg. of virulent tubercle bacilli and, beginning on the fifth day after the inoculation, they were treated with daily doses of French or American penicillin at the rate of 10 to 20 O. U. per gram of body weight. All of the guinea pigs thus treated died within ten days. The necropsies revealed pronounced glandular reactions, dilated and blood-filled vessels of the liver and spleen and, in rare cases, the presence of acid-alcohol-resistant organisms in the lymph nodes. No such reaction occurred in the controls treated with the same quantities of penicillin. The conclusion drawn was that the presence of tuberculosis may forbid the use of penicillin for concurrent infections.

*Hauduroy, Paul, and Rosset, Willy: Annales de l'Institut Pasteur, 75, July, 1948): 67-69.

## Rabies in a Young Cow

On Sept. 13, 1948, I was called to see a cow with a bowel ailment accompanied by severe and continuous straining. Although authorities state that no elevation of temperature is present in rabies in cattle, the cow's temperature was 105.2 F.

After the death of the animal, the head was removed and sent to the Ohio Department of Health, Columbus, Ohio. Laboratory examination of the brain showed the presence of Negri bodies, confirming the clinical diagnosis of rabies.

The owners of the animal and the veterinarian took the antirabies treatment since, although identifying symptoms of rabies were not present in the early stages of the disease, there was some danger of infection.—*William E. Jones, D. V. M., Leesburg, Ohio.*

## Streptomycin-Accelerated Tuberculosis

Spendlove and coworkers report the isolation of a strain of *Mycobacterium tuberculosis* (var. hominis) whose growth was markedly accelerated by the presence of streptomycin in the culture medium. In control tubes without streptomycin, growth of the germ was poor. The organism came from the sputum of a pulmonary tuberculosis case which had exhibited rapid progression during a course of streptomycin therapy. Though the cause is not understood, this is not an unprecedented happening, as other investigators have observed it in the case of certain strains of meningococci which required streptomycin for reproduction *in vivo* and *in vitro*, and in a variant of *Mycobacterium ranae* as well as in other organisms.—*Pub. Health Rep., Sept. 3, 1948.*

*Nitrogen Mustard.*—The important results obtained from the use of nitrogen mustard (mustard gas) in leucemia, Addison's disease, *et al.*, is an example of beating swords into plowshares. Its dynamics appear to be based upon its favorable action on hematopoietic tissue, mitosis, and the intracellular enzyme systems. Though American workers are generally given credit for the discovery, priority (*Brit. Med. J.*, Aug. 7, 1948) belongs to Dr. Wilkinson and his colleagues of Manchester, whose first researches could not be published owing to wartime restriction.

# Urinary System of the Camel

M.A.F. TAYEB, M.V.Sc.

*Cairo, Egypt*

ALTHOUGH the urinary system of most domesticated animals has been fully described, little is known about that of the camel. It is essential to have sufficient knowledge of the anatomy of the urinary organs of the camel to explain the abnormal conditions found in that animal.

## LITERATURE

Chauveau[1] states that the kidneys of the camel are not lobulated, and that the pelvis resembles that of the horse, with an arrangement which establishes a transition between the ox and solipeds.

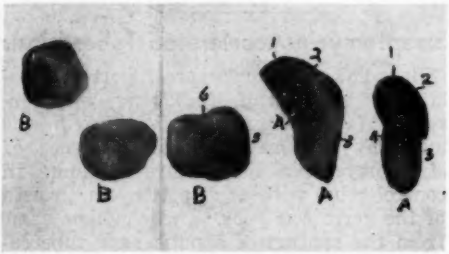


Fig. 1—A. Right adrenal glands, crescentic and oblong types. (1) Cranial pole; (2) cranial part of the medial border; (3) caudal part of the medial border; (4) lateral border. B. Left adrenals. (5) Cranial end; (6) medial border.

Lesbre[2] states that the kidneys of the camel resemble those of the sheep and goat in form; both are voluminous, the left kidney weighing 800 Gm. and the right 750 Gm. He reports also that the right kidney is anterior to the left and that the posterior pole of the former is in line with the anterior pole of the latter. The left kidney is pushed in the pelvic inlet by the rumen and the right is pressed against the superior border of the liver. He adds, further, that the fibrous capsule is thick, opaque, and adherent to the underlying tissue, and the medulla forms one renal crest, as in other animals which have a common papilla (sheep, goat, dog, and horse). The radiations of the mucous membrane of the pelvis form a complex labyrinth. The left renal artery is oblique and sends a collateral branch to the spleen. He states that the ureter of the camel resembles the ureter of other animals and the urinary bladder has a thin wall.

Leese[3] points out that the kidneys of the camel are large, not lobulated, and are similar in shape and size. The right kidney lies anteriorly and each kidney weighs 2 lb. He reports also that the urinary bladder is small.

The object of this work is to present the macroscopic and microscopic anatomy of the urinary system of the camel.

## MATERIALS AND METHOD

The urinary organs described here were obtained from the slaughterhouse of Cairo.

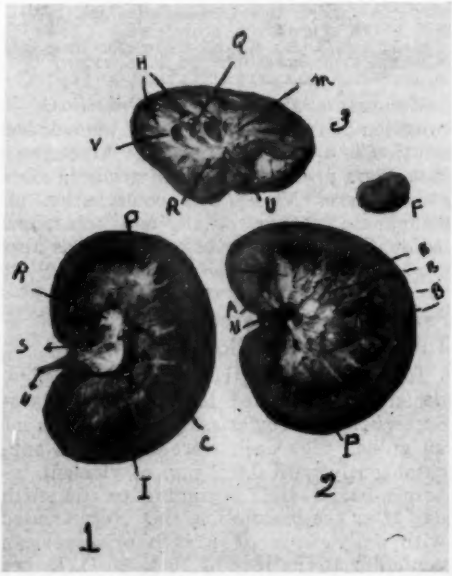


Fig. 2—1. Horizontal section in the right kidney showing (R) renal pelvis; (S) renal sinus; (e) probe passing through the ureter; (U) and resting on the renal crest; (M) medulla; (C) cortex; (I) intermediate zone; (P) cranial pole.

2. Horizontal section of the left kidney on a higher level than No. 1, showing (B) the attached borders of the arches (the borders attached to the cortex); (A) one of the branches of the renal artery sending its branches in between the folded layers of the arches; (U) ureter; (P) caudal pole.

3. Horizontal and vertical sections in a kidney showing (V) vertical arches; (H) horizontal or shelflike arches; (Q) quadrilateral loculi; (m) medulla partly removed; (R) renal pelvis; (U) ureter; (F) kidney of fetus, 50 cm. long.

Lecturer in Department of Anatomy, College of Veterinary Medicine, Fuad I University, Cairo, Egypt.

The organs of 50 mature Sudanese male and female camels were obtained for description, weight, and measurement in the fresh state and then preserved in 10 per cent formalin solution for further examination. Some kidneys were injected, through the renal artery, with colored formalin solution to study the course of the blood vessels. The organs were investigated *in situ* in many carcasses in the slaughterhouse to determine their position and relation to other organs.

In addition, 2 male camels were bled prior to their injection *via* the carotid artery with the following:

| | |
|---|---|
| White arsenic | 200 Gm. |
| Sodium carbonate | 200 Gm. |
| Pure carbolic acid | 2.5 kg. |
| Glycerine | 2.5 kg. |
| Formalin 40% | 2.5 kg. |
| Hot water | 25 liters |

Sufficient Berlin blue was added to this to impart its color to the injection fluid and, during the process of injection, 2 kg. of calcium sulfate (gypsum) were gradually stirred into the injection material to harden the arteries.

Besides the macroscopic anatomy of the urinary organs, a microscopic examination was made.

The urinary system of the camel comprises the kidneys, ureters, urinary bladder, and urethra (the urethra and the urogenital sinus are described with the genital organs). In addition, the adrenal glands are described.

## THE KIDNEYS

Examination of the kidneys revealed a smooth (not lobulated) surface and bean-shaped form. Both had the dorsal surface flattened and the ventral surface convex. The lateral borders were rounded in both the craniocaudal and the dorsoventral directions. The medial border was rounded and deeply notched, not exactly in the center, by the hilus, so that a cross section, passing through the kidney in the region of the hilus, divided it in two unequal parts.

The cranial division was the larger in the right kidney, but was smaller in the left kidney. The cranial pole of the left kidney was pointed and the caudal one was so much rounded that the organ resembled the human ear. Due to the more rounded contour and shorter length of the right kidney, it appeared somewhat globular in form. The ventral branch of the left renal artery divided into two branches just before it approached the hilus of the left kidney.

In all the specimens examined, the left kidney was more voluminous than the right. In mature animals (both sexes), the average weight of the left kidney was 1,000 Gm. and measured about 19 cm. by 12 cm. by 9 cm. The right kidney weighed about 900 Gm. and measured 18 cm. by 10.5 to 11 cm. by 7 to 8 cm. In the largest specimen studied, the left kidney weighed 1,462.5 Gm. and measured 22 cm. by 12.5 cm. by 8 cm., and the right kidney weighed 1,350 Gm. and measured 20.5 cm. by 10 cm. by 8 cm. The left kidney was differentiated from the right, in contradiction of the statement of Lesbre and Leese that both kidneys are alike.

Both kidneys were embedded in capsula adiposa the amount of which increased or decreased according to the condition of the animal.

Unlike other domesticated animals, it was noted that in a fresh, normal kidney, the renal fibrous capsule (tunica fibrosa) was so dense and opaque that the intact kidney appeared grayish or bluish white. It was strongly adherent to the cortical substance and, when forcibly detached, the latter presented a rough surface.

### POSITION AND RELATION

The right kidney extended under the first, second, and third lumbar spaces. It

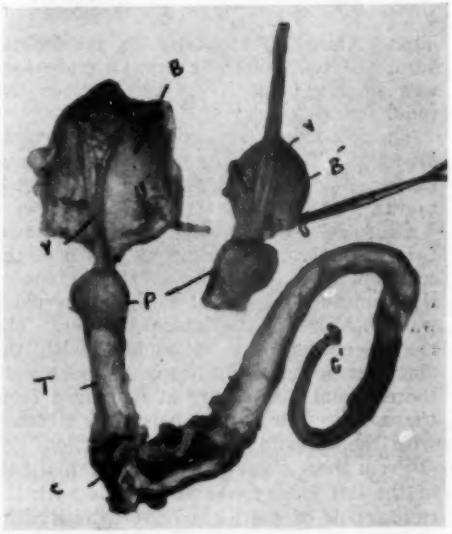


Fig. 3—Male organs showing (B) distended urinary bladder; (U) Ureter; (V) vas deferens; (P) prostate; (T) pelvic urethra; (c) cowper's gland; (G) glans penis; (B') partly distended urinary bladder.

was related, dorsally, to the psoas minor and major and, ventrally, to the duodenum and dorsal division of the colon. The medial border was in contact with the vena cava, except its dorsocranial part which was capped by the right adrenal gland. The

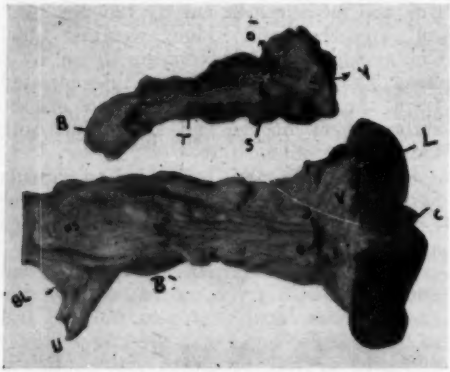


Fig. 4—Female organs. The upper figure shows (T) opened female urethra; (S) suburethral sinus; (B) normally contracted urinary bladder; (O') external urethral orifice cut; (V) vulva.
The lower figure shows (os) external os of the uterus; (BL) broad ligament; (U) ureter; (B') distended urinary bladder; (V') vagina; (O) external urethral orifice. 1, 2, and 3 are orifices of glandulae vestibulae minores, majores and Gaertner's canal; (L) labia valves.

lateral border was related to the lateral border of the liver. The renal impression was so deep that it may be termed the renal fossa.

The left kidney lay under the transverse processes of the fifth, sixth, and seventh lumbar vertebrae. Dorsally, it was related to the psoas muscles.

Caudally and laterally, the ventral surface was related to the ansa spiralis of the colon and, cranially, the dorsal surface of the rumen. The dorsal side of the spleen was molded on its lateral border. The medial border was in contact with the aorta, except caudally it was in touch with the external iliac artery at its origin from the aorta. The caudal pole was in touch with the sigmoid flexure of the colon.

From these observations, the cranial pole of the left kidney was not in line with the caudal pole of the right one—in contradiction of the statement of Lesbre.

Unlike the ox, the left kidney in the camel occupies a higher position and is more restricted in mobility, due to the small size of the renal fascia, so that, in the case of distention of the rumen by feed, no deviation of the organ was noticed either to the right of the median plane or caudally toward the pelvic inlet.

Owing to the more caudal position of the left kidney in the camel, it was successfully palpated *per rectum*.

### RENAL ARTERIES

Examination of the renal arteries in injected carcasses and in several in the slaughterhouse revealed that the right renal artery originated from the aorta at its lateral aspect, somewhat dorsally in line with the cranial mesenteric artery under the first lumbar vertebra. It passed laterally over the vena cava to reach the right kidney. Just at the lateral border of the vein, the artery divided into a dorsal and a ventral branch. The former passed through the hilus dorsal to the ureter and the latter, ventral to it. The left renal artery originated from the lateral aspect of the aorta near its ventral aspect, caudal to the cranial mesenteric artery, under the second lumbar vertebra. It passed obliquely, in a caudal, lateral, and slightly ventral direction, about 16 to 17 cm. to reach its destination. After 2 or 3 cm., the artery divided into two branches as the right renal artery. No collateral branch to the spleen was seen—contrary to the statement of Lesbre. The renal veins were situated ventrally in the hilus.

### STRUCTURE OF THE KIDNEY

Sections through fresh kidney revealed the presence of the same zones found in the kidneys of other domesticated animals; in other words, the external (cortical substance) was dark brown; the intermediate, shining, dark red; and the medullary substance pale brown. The renal sinus presented itself as a triangular space, the apex of which lay at the hilus. The renal pelvis was a narrow crescentic cavity and the medulla formed a projecting renal crest, as in the sheep, dog, and horse. The only difference was in the extension of the mucous membrane of the renal pelvis dorsally and ventrally into about 12 radiating processes which diverge toward the lateral border of the organ (plate 1). Each process was folded, forming two layers accommodating the blood vessels between them. Both the dorsal and the ventral processes joined laterally, forming arches, the convex borders of which were attached to the cortical substance, and the concave, rounded borders were directed to-

ward the medullary substance. Horizontal arches, forming shelves or bridges, joined the vertical arches, forming quadrilateral loculi. Divisions of the medullary substance were lodged in these loculi through their passage to the cortex. The depth of these loculi was equal to that of the intermediate zone. Both the dorsal and ventral branches of the renal artery followed the arches in their radiations and anastomoses. The veins united to form a dorsal and ventral large vein; the dorsal vein passed in a vertical direction, cranial to the ureter, to join the ventral one, forming the renal vein.

### THE URETER AND URINARY BLADDER

*The Ureter.*—Findings agreed with those made by Lesbre in the relation and position of the ureter but, owing to the situation of the left kidney, the left ureter was found shorter than the right. In mature animals, the right ureter measured about 50 to 55 cm. in length and the left, about 35 to 40 cm., in both sexes. Each measured about 4 mm. in diameter.

*The Urinary Bladder.*—In both sexes, the urinary bladder was small, both actually and relatively, in comparison to the size of the animal. In the contracted state, it was oval, with its cranial end somewhat pointed, and never exceeded the size of a goose egg. It measured 5 to 7 cm. long and 4 to 5 cm. at its widest part. Relatively, it had a thick wall, about 1 to 1.3 cm.—contrary to the statement of Lesbre.

The position of the urinary bladder was wholly pelvic and only in extreme distension did it slightly protrude from the pelvic inlet. The attachment of the lateral ligaments to the lateral walls of the pelvis were on a lower level than in the horse. When fully distended, its capacity reached about 600 to 700 cc. Its relation to the pelvic organs was the same as in other domesticated animals, except dorsally it was related only to the rectum, vas deferens, and prostate. The vesicula seminalis and the uterus musculinus were absent.

Internally, the mucous membrane was rosy, gradually becoming paler toward the neck.

In the female, the bladder was related dorsally to the vagina and only when fully distended did it reach the cervix.

*The Urethra in the Female.*—The female urethra was about 2 cm. in diameter and about 10 to 11 cm. long. The external urethral orifice opened on the floor of the vulva, measuring 1 cm. in diameter and was not dilatable. There was a suburethral sinus on the floor of the orifice.

### ADRENAL GLANDS

These were two yellowish orange or dirty yellow, flattened bodies. They differed in shape and position. The right adrenal was an elongated crescent. Its dorsal surface was flattened and related to the right crus of the diaphragm. The ventral surface was convex and related to the duodenum. The medial border was in contact with the vena cava caudally, but its cranial part and cranial pole were embedded in the renal fossa of the liver. The lateral border was concave and molded on the craniodorsal part of the medial border of the right kidney.

The left adrenal was a flattened, disclike body but it was longer craniodorsally than it was transversely. It related, dorsally, to the left crus of the diaphragm and about 7 to 8 cm. cranial to the anterior pole of the left kidney. The medial border was limited by the angle between the vena cava and the left renal vein. Ventrally, it was related to the dorsal surface of the rumen.

The right adrenal weighed 40 to 50 Gm. and measured about 7 to 8 cm. by 3 to 5 cm. The left gland weighed 35 to 40 Gm. and measured 4 to 5 cm. by 3 to 4 cm.

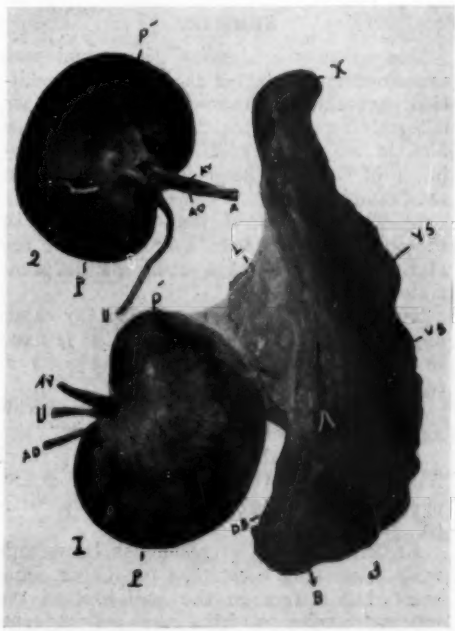


Fig. 5—1. Left kidney showing pointed cranial pole P'; (V) renal vein; (AV) the ventral branch of the renal artery divided into two branches at the hilus; (U) ureter; (D) dorsal branch of the renal artery; (P) caudal pole.

2. Right kidney showing (P') cranial pole; (A) right renal artery showing its division into two branches ventral (AV) and dorsal (AD) in the neighborhood of the kidney; (U) ureter; (P) caudal pole.

3. The spleen showing (X) apex; (VS) medial surface; (VB) ventral border; (DB) dorsal border; (L) splenic ligament.

BLOOD AND NERVE SUPPLY

The ureter received its blood supply from the renal, internal spermatic artery, and its nerve supply from the coeliac and pelvic plexuses. The urinary bladder received its blood supply from the internal pudic artery, and the nerves from the pelvic plexus and the third and fourth sacral nerves. The coeliac plexus supplies both the kidneys and adrenal bodies.

The right adrenal received its blood supply from the aorta; no branch from the right renal artery was noticed, as in the horse. The left gland received its blood supply from the aorta but, in some carcasses, a branch from the left renal artery was noticed.

*Microscopic Examination.*—The paraffin-embedding method was used. The findings were the same as in other animals.

SUMMARY

The urinary system of the camel was examined in 2 injected carcasses. In addition, several organs were obtained after determining their position and relation *in situ* in many carcasses in the slaughterhouse of Cairo. The results obtained from this study were:

1) The kidneys of the camel are both bean-shaped with smooth surface, but the right and left kidneys could be differentiated.

2) The left kidney is situated far caudally and, unlike other ruminants, it is fixed in position and is easily palpated *per rectum.*

3) The position and relation of both kidneys are recorded for the first time.

4) In the fresh, normal state, the renal fibrous capsule (tunica fibrosa) is dense, opaque, and strongly adherent to the cortical substance.

5) In structure, it resembles those animals possessing a common papilla or renal crest, but differs in the radiation of the mucous membrane of the renal pelvic, forming arches which surround the renal blood vessels and penetrate the medullary substance.

6) The left renal artery is long and oblique in its course. No collateral branch from this artery to the spleen was noticed.

7) The adrenal glands are described for the first time; they differ in shape and size. The left adrenal is situated far anterior to the pole of the left kidney.

8) The urinary bladder is relatively small, with thick walls, and is wholly pelvic in position.

9) The external urethral orifice in the female is small and not dilatable. On its floor, a suburethral sinus is present.

10) Microscopic examination revealed the same findings present in other domesticated animals.

I am grateful to Professor El Sayed Fouad, M.V.Sc., Liverpool, the dean of the veterinary college at Cairo, and his assistant M. R. El Hindawy, M.V.Sc., Cairo, for allowing the histologic part of this work to be done in their laboratory.

References

[1]Chauveau, A.: The Comparative Anatomy of the Domesticated Animals. 2nd Edition. J. and A. Churchill, London, 1891.

[2]Lesbre, M. F.: Recherches Anatomiques sur les Camelides. Extract, Archives du Museum of Natural History, Lyon, France, (1906): 106-108.

[3]Leese, A. S.: A Treatise on the One-Humped Camel. Haynes and Sons, Maiden Lane, Stamford Lincolnshire, 1927.

[4]Abul-Aziz-Neumani Bey: The Comparative Osteology of the Camel. Cairo, 1911.

## Veterinary Service in the American Zone in Europe

Writing on the veterinary service of the American army of occupation in Germany, Bocquet[1] is quoted as follows in the September issue of *Recueil de Médecine Vétérinaire:*

The experiences of the veterinary service of the American army air forces shows that this service is no longer uniquely attached to military horses and that it is necessary to foresee its utilization on a larger scale, whatever is its type. The strategical air forces of the American army in Europe renders a service that operates in liaison with the medical department of the characteristically mobile air forces. Its activity includes protection of food against war chemicals, food conservation, control of storage house rats, prevention of food poisonings and diseases of animals transmissible to man, care of military watch dogs and mascots, sanitary control of kennels, coöperation with civilian authorities and local veterinarians in connection with veterinary questions.

The results have shown that by his scientific qualifications, the veterinarian is the proper person to supervise all matters pertaining to the alimentation of troops and, especially therefore, chemical and microbian warfare. The liaison of human and veterinary medicine is a prolific activity in preventive medicine among troops in preparation for combat.

[1]Bocquet, L.: Le service vétérinaire dans l'armée de l'air américaine. Rev. militaire, 2, (1946): 104.

# Transmissible Gastroenteritis of Baby Pigs

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IN THE COURSE of study of a suspected virus disease of the gastrointestinal tract of the human infant it was deemed wise to study the transmissible gastroenteritis of baby pigs in order to make comparisons and differentiations with conditions in baby pigs fed material from infants suffering from epidemic diarrhea. Material from a case of transmissible gastroenteritis of baby pigs was obtained from Dr. L. P. Doyle of Purdue University. Several experiments were designed to investigate the nature of the disease and its etiology. The results were similar to those reported by Doyle and Hutchings[1] and are given here to lend confirmation to their findings.

## MATERIALS AND METHODS

Litters of pigs were taken from their mothers at the age of 4 to 5 days and placed in isolation pens, taught to drink from a shallow pan, and, as soon as they became adjusted to their new environment and food, placed under observation and fed the infective material.

Their food consisted of irradiated evaporated milk given at the approximate rate of 1 to 2 oz. per pig, 8 times a day at three-hour intervals. They were without food from about 10 p.m. to 7 a.m. The milk diet was fortified with iron, copper, cobalt, manganese, magnesium, ascorbic acid, brewer's yeast, and shark liver oil. The breed of pig used was the Chester White except 1 pig (No. 13) was a Duroc Jersey. Practically all of the pigs learned to drink from a shallow pan in twenty-four hours.

The pigs were bled by means of a syringe and 18-gauge needle from the jugular vein (1 cc.) and hemoglobin (Cenco-Sheard-Sanford photelometer), erythrocyte, leucocyte, and differential leucocyte counts (100 cells per slide) were determined.

In some cases, the entire gastrointestinal tract was removed and frozen for use as infective inoculum in a ground state, and in other cases, sections of the affected tissues were placed in Zenker's fixing solution and paraffin sections were prepared and stained with hematoxylin and eosin for histopathologic study.

Temperatures (rectal) were recorded daily.

Whenever bacteria-free filtrates were used, the usual procedure was to grind portions of the spleen, liver, stomach, and intestines in a Latopie tissue grinder and mix with approximately equal parts of beef extract broth. This suspension was first filtered through a Seitz clarifying disc and then through the EK disc. No bacterial growth was obtained on aërobic mediums and no bacterial forms were seen in stained preparations.

## EXPERIMENTAL

*Experiment 1.*—Pigs 1, 2, and 3 were fed infective material furnished by the above mentioned worker and, in general, they reacted similarly. A slight initial rise in body temperature in the first twenty-four hours was followed by a decline to below normal. Their appetites diminished after the first twenty-four hours followed by vomiting, rapid loss of weight, weakness, and dehydration. The feces became greenish yellow and fluid. An increase in the erythrocyte count and hemoglobin values may be correlated with the dehydration. Two of the pigs showed a slight increase in leucocyte counts and 1 showed a slight decrease, while all 3 showed a marked decrease in lymphocyte percentages and an increase in neutrophil percentages. After four days, the pigs were killed and necropsy performed. The only abnormalities noted were general dehydration and rather diffuse hemorrhages in the wall of the stomach. The digestive tracts were removed and stored in a refrigerator freezing compartment for future use.

**Table 1—Daily Temperatures**

| Control pig (No. 12) | | Infected pig (No. 1) | | Infected pig (No. 10) | |
|---|---|---|---|---|---|
| Age (days) | Temp. (F.) | Age (days) | Temp. (F.) | Age (days) | Temp. (F.) |
| 7 | 102.4 | | | 7 | 102.6 |
| 8 | 102.3 | 8* | 103.8 | 8 | 102.4 |
| 9 | 101.6 | 9 | 103.0 | 9 | 101.8 |
| 10 | 101.8 | 10 | 100.8 | 10 | 102.2 |
| 11 | 101.6 | 11 | 99.7 | 11 | 101.8 |
| 12 | 102.6 | 12 | 98.9 | 12* | 103.0 |
| 13 | 102.0 | .. | ... | 13 | 103.6 |
| 14 | 101.6 | .. | ... | 14 | 101.9 |
| 15 | 102.2 | .. | ... | 15 | 101.6 |
| 16 | 101.8 | .. | ... | 16 | 101.9 |

*Fed infective material.

From the sections of Animal Pathology (Feenstra, Thorp, Gray) and Animal Husbandry (McMillen), Michigan Agricultural Experiment Station, East Lansing, Mich.

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Pig 6, kept isolated as a normal control for the first three experiments, exhibited no unusual symptoms during the two weeks it was under observation, except for an increase in the number of leucocytes. No abnormalities were noted during microscopic examination of tissue sections from the digestive tract and other organs.

*Experiment 2.*—After pigs 1 and 2 exhibited definite symptoms (on the third day), pig 4 was placed with them as a pen exposure. Within twenty-four hours its temperature rose almost 2 degrees and it showed vomiting and diarrhea. After forty-eight hours the appetite diminished and loss of weight was evident. The results of the blood studies and the results at necropsy three days after exposure were not abnormal.

*Experiment 3.*—Pig 5 (about 2 weeks old) was given a bacteria-free filtrate prepared from the digestive tract of pig 3. Besides weakness, no abnormal symptoms were noted. The only significant hematologic alterations were an increase in the number of leucocytes, an increase in the percentage of neutrophils, and a decrease in the percentage of lymphocytes.

*Experiment 4.*—Pigs 7, 8, and 9 were fed portions of the finely ground digestive tract of pig 3 and necropsies performed at 24-hour intervals after exposure in an effort to study the progresive pathologic changes. Pig 7 (24 hours) showed an increase in temperature (1½ degrees) and no significant gross or microscopic lesions. Pig 8 (48 hours) showed a slight initial increase in temperature (0.5 degree), a decrease in leucocyte count, and at necropsy there were hemorrhages in the cardiac region of the stomach. Microscopically, there was a focal lesion in the gastric mucosa about 2 mm. in diameter characterized by hemorrhage, mucoid degeneration, necrosis of the glandular and surface epithelium, accumulation of lymphocytes, and more diffuse hemorrhage (about 6 mm. in diameter) in the submucosa. In another section, there was a diffuse hemorrhage in the gastric submucosa. The liver exhibited a mild degree of cloudy swelling. Pig 9 (72 hours) showed a slight initial rise in temperature (0.7 degree), loss of appetite, dehydration, an increase in the number of neutrophils, and, at necropsy, hemorrhage in the pyloric region of the stomach. The vestigial character of the thymus may have been related to the fact that this pig was the runt of the litter. Microscopically, one of the sections of the stomach showed focal lesions in the mucosa characterized by necrosis of epithelium, congestion, and sludged blood in capillaries and venules of the mucosa and submucosa. The kidney section showed some necrosis of the proximal convoluted tubules.

Pig 12 was kept as a normal control for experiments 4 and 5.

*Experiment 5.*—Pigs 10 and 11 (age 2 weeks) were given a portion of bacteria-free Seitz filtrate from the tissue of the digestive tract of pig 3. Both pigs showed an initial increase in temperature, loss of appetite, vomiting, diarrhea, dehydration, and weakness. Pig 11 showed an increase in percentage of neutrophils. At necropsy, on the fourth day after exposure, neither pig showed any abnormalities. Microscopically, pig 10 showed some slight hemorrhages in the submucosa of the stomach.

*Experiment 6.*—Pig 13 was given a portion of bacteria-free filtrate of tissue of the digestive tract of pig 9. There was an initial increase in temperature, loss of appetite, vomiting, diarrhea, and weakness. At necropsy, there was a hemorrhage (1 cm. in diameter) in the cardiac region of the stomach. Microscopically,

**Table 2—Hematology**

| Age (days) | Erythrocytes (thousands per cmm.) | Leucocytes (per cmm.) | Hemoglobin (Gm./100 cc.) | M | L | N | S | B | E |
|---|---|---|---|---|---|---|---|---|---|
| **Control pig 12** | | | | | | | | | |
| 7 | 5,210 | 7,600 | 8.6 | 1 | 68 | 27 | 0 | 2 | 2 |
| 12 | 5,970 | 8,900 | 11.1 | 3 | 67 | 30 | 0 | 0 | 0 |
| 16 | 7,390 | 10,750 | 10.1 | 1 | 80 | 19 | 0 | 0 | 0 |
| **Infected pig 1** | | | | | | | | | |
| 7 | 4,750 | 7,500 | 8.0 | 3 | 62 | 34 | 0 | 1 | 0 |
| 10* | 6,120 | 5,750 | 9.5 | 2 | 70 | 27 | 0 | 0 | 1 |
| | | | | 3 | 36 | 59 | 1 | 1 | 0 |
| **Infected pig 10** | | | | | | | | | |
| 7 | 4,950 | 7,050 | 8.9 | 2 | 39 | 57 | 0 | 1 | 1 |
| 12** | 6,290 | 10,450 | 10.6 | 0 | 66 | 33 | 0 | 1 | 0 |
| 16 | 8,290 | 6,650 | 12.9 | 1 | 43 | 56 | 0 | 0 | 0 |

*Fed infective material at eight days of age.
**Fed infective material.
M=monocytes; L=lymphocytes; N=neutrophils; S=stab cells; B=basophils; E=eosinophils.

the hemorrhage was located in the gastric submucosa.

Tables 1 and 2 give examples of temperature records and hematologic data from 1 normal and 2 inoculated pigs.

## DISCUSSION

The course of transmissible gastroenteritis of baby pigs in experimentally exposed pigs was as follows: An initial rise in temperature in the first twenty-four hours after exposure was followed by a gradual decline until the pigs became moribund about four to six days after exposure. During the second and third days, there was often vomiting, loss of appetite, diarrhea (greenish yellow, pasty to watery feces), dehydration, and weakness. After the third day, the symptoms usually became more marked. None of the pigs exhibited any signs of recovering before they were killed for necropsy. The significant gross lesion seemed to be the hemorrhage in the wall of the stomach. Microscopically, the lesions appeared as necrotic foci in the mucosa, characterized by necrosis of the epithelial cells, hemorrhage, mucoid degeneration, and infiltration by leucocytes, and associated with sludged blood in capillaries and venules, and hemorrhage in the submucosa. Because the number of cases studied microscopically was small, the findings may not be conclusive. Lesions of the intestine as described by Doyle and Hutchings[1] were not noted although the diarrhea was often marked.

All the infected pigs did not exhibit the entire list of symptoms and lesions. Those which r e c e i v e d bacteria-free filtrates seemed to have a less severe reaction than did those which were given a portion of ground, whole digestive tract. This may have been due to the dilution and partial loss of the active agent during the process of filtration.

The possibility of hog cholera virus being involved in this condition has been eliminated by trials by Doyle and Hutchings.[1]

## SUMMARY AND CONCLUSION

The results of experiments designed to furnish information regarding etiology, symptoms, pathogenesis, and lesions of transmissible gastroenteritis of baby pigs have been recorded and discussed.

The etiologic agent appeared to be filterable.

The symptoms were fever, anorexia, vomiting, diarrhea (greenish yellow, fluid to pasty feces), dehydration, and weakness.

The significant gross lesion appeared to be hemorrhage in the wall of the stomach. Microscopically, necrotic foci in the gastric mucosa were associated with hemorrhage in the submucosa.

[1]Doyle, L. P., and Hutchings, L. M.: A Transmissible Gastroenteritis in Pigs. J.A.V.M.A., *108*, (1946): 257-259.

## Calf Diseases

When problem herds are found with calf septicemia, provide separate maternity barns. . . . Prompt intravenous sulfonamide therapy of early cases of calf pneumonia will prevent many deaths as well as chronic cases. . . . Encourage sulfonamide-treated animals to drink large quantities of water or give them water by manual administration to prevent kidney damage. . . . Vitamin A given in 500,000-unit doses once a week during the last month of pregnancy seems to reduce the number of calves born weak or dead.—*University of Minnesota Annual Short Course for Veterinarians, Oct. 29-30, 1947.*

## Kaolin-Glycerin Treatment of Foot Rot and Photosensitization

Cold application of a kaolin-glycerin mixture, without bandaging, is recommended in place of ointments containing paraffin or fats for treating foot rot in cattle and sheep and acute inflammation of the skin, such as photosensitization (Rainey, *Austral. Vet. J.*, July, 1948). This mixture does not macerate the skin, and the glycerin "may have some value in lessening bacterial activity." The early relief of skin tension afforded by the kaolin-glycerin compound obviates local necrosis and thereby minimizes the danger of infection in underlying tissues. The sulfonamide treatment widely used by American veterinarians was not tried.

*Pig Mortality in England.*—Out of every 10 pigs farrowed in England, 2 die before weaning time and another dies before marketing (*Vet. Rec.*, Apr. 10, 1948). The government is seeking to triple the production of pigs within the next five years and veterinarians are being urged to give more study to the cause and prevention of swine diseases as a means of helping achieve this goal.

# Sulfamethazine Blood Concentrations in Dogs and Cats

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MARK WELSH, D.V.M., and PETER H. LANGER, V.M.D.

*Pearl River, New York*

EFFECTIVE sulfonamide therapy of acute bacterial disease is directly dependent on the maintenance of adequate concentrations of the drug in the blood and tissues. Marshall, in summations[1-3] of the results of the innumerable investigations that have been made since the introduction of the sulfonamides, has continuously stressed the importance of this premise. He further pointed out[2] that the accurate and simple methods of determination of blood concentrations available have been responsible for placing dosage schedules on a rational basis. The distribution of the sulfonamides in all body tissues is usually equal to the concentration of free unbound drug in plasma water. Therefore, determination of free drug in blood should give some indication, if only an approximation, of the concentration which might be expected at the site of infection. Sulfonamides have been found particularly effective in acute bacterial disease when the pathogenic organisms are extracellular and in the logarithmic phase of growth. Their effectiveness is reduced as chronicity approaches, especially when there is intracellular involvement and tissue changes occur.

Following the successful use of sulfonamides in human medicine, their administration in animal diseases was studied. Early in this work, it was found[4] that there was considerable variation in absorption and excretion of sulfanilamide in horses, cattle, and dogs. As other sulfonamides became available, they were used successfully in the treatment of infections in animals associated with pathogens similar to, or identical with, those in human infections. Therefore, experiments[5] were instituted to determine excretion rates in seven animal species of seven sulfonamides (sulfamethazine, sulfadiazine, sulfamerazine, sulfathiazole, sulfapyridine, sulfaguanidine, and sulfanilamide) to be used as a guide for dosage which would permit the establishment of adequate levels for the treatment of disease. A fixed low dosage of ½ gr./lb. of body weight was administered orally, and it was shown that each sulfonamide has a different excretion rate in each species of animals. This work was done also in chickens and turkey poults[6] with the drugs administered in the feed at the rate of 0.2 per cent, and fed *ad libitum* for three days. In general, sulfamethazine produced the highest and most persistent blood concentrations in all species.

Sulfamethazine has been found to be one of the least toxic of the sulfonamides in animals.[7, 8] Its bacteriostatic action against a wide variety of both gram-negative and gram-positive organisms, *in vitro* and *in vivo*, has been tabulated by Francis[8] in a summary of his own work and that of other investigators. On the basis of these findings, studies were instituted to determine adequate dosage of sulfamethazine by various routes of administration in the various animal species.[9-12] The results of these studies indicated that a single, non-

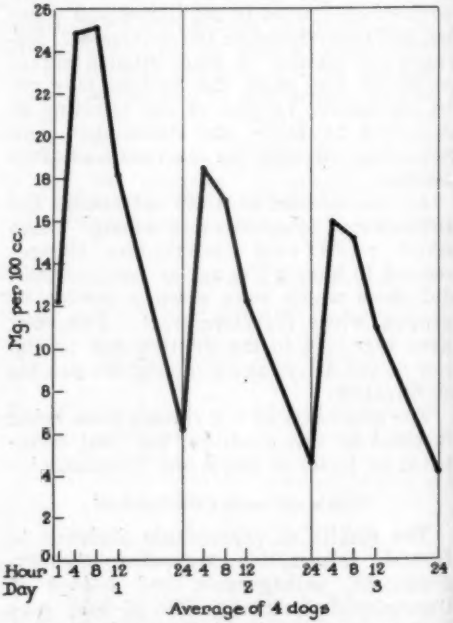


Fig. 1—Sulfamethazine blood concentrations in dogs. Dose (subcutaneous administration): first day—1½ gr./lb. of body weight; second and third days—1 gr./lb. of body weight.

The authors are indebted to Mr. Frank Leyrer, Animal Industry Section, for aid in the conduct of the program, and to Mr. S. Senn, Analytical Section, Lederle Laboratories Division, American Cyanamid Company, for sulfonamide analyses.

toxic dose of the drug will maintain therapeutic blood concentrations for twenty-four hours. This paper continues this series and is a report on sulfamethazine blood concentration studies in dogs and cats.

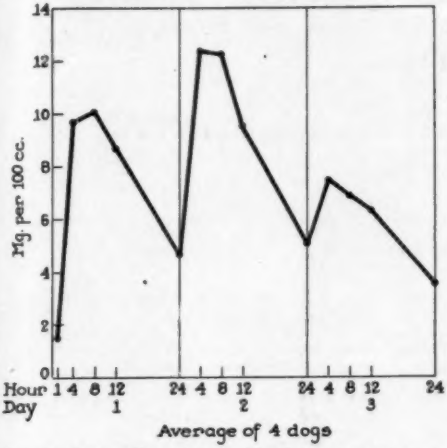


Fig. 2—Free sulfamethazine blood concentrations in dogs.
Dose (oral administration): first day—1½ gr./lb. of body weight; second and third days—1 gr./lb. of body weight.

## PROCEDURE

Experiments were instituted in dogs and cats to determine blood concentrations of sulfamethazine following parenteral and oral administration once daily. Normal, adult animals of both sexes were used. Sodium sulfamethazine 25 per cent w/v sterile solution was used for parenteral administration. Sulfamethazine powder was placed in gelatin capsules for oral administration. Blood samples were taken one hour after the initial drug administration, and at four, eight, twelve, and twenty-four hours on each of the three days of the tests. Sulfonamide determinations were made according to a modification[5] of the Bratton-Marshall[13] method.

*Experiment 1.*—Eight dogs, weighing 35 to 59 lb. were used. The drug was administered subcutaneously to 4 at a dosage of 1½ gr./lb. of body weight the first day, and 1 gr./lb. on the second and third days. Sulfamethazine was administered orally to 4 dogs at the same dosage.

*Experiment 2.*—Twelve cats, weighing 5½ to 10½ lb., were used. Sulfamethazine was administered subcutaneously to 6 and orally to 6. The dosage was 1 gr./lb. on the first day and ½ gr./lb. on the second and third days. In each test, the blood of 2 cats was pooled for sulfonamide determination.

Although aqueous solutions of the sodium salts of sulfonamides are highly alkaline, in this instance pH 10.3, the solution was well tolerated when injected subcutaneously in divided doses, followed by gentle massage of the site of administration. Intravenous therapy obviously calls for slow administration to prevent immediate reactions due to acute alkalosis. Usually, this highly alkaline solution is rapidly buffered by the animal and no untoward reactions will be noted if administration is made slowly.

## DISCUSSION

Average sulfamethazine blood concentrations following subcutaneous administration in dogs are shown in figure 1. As in other species of animals, high concentrations were attained promptly, indicating saturation of the tissues. It has been found that extremely high levels are attained and rapid elimination of the drug from the blood follows in these carnivorous animals. However, even with the high blood levels of more than 25 mg./100 cc. which were recorded at the fourth and the eighth hours, there were no evidences of toxicity. Following the lower dosage on the second and third days, concentrations considerably lower than the initial maximum levels were attained. Blood concentrations sufficient for optimum therapeutic effectiveness persisted through each day of the test.

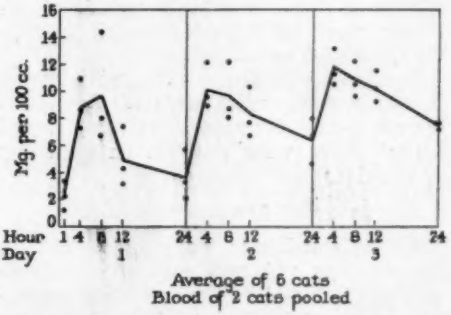


Fig. 3—Free sulfamethazine blood concentrations in cats.
Dose (subcutaneous administration): first day—1 gr./lb. of body weight; second and third days—½ gr./lb. of body weight.

Figure 2 summarizes the blood concentrations in dogs following oral administration of the drug. Effective levels were attained more slowly, maximum levels attained were not so high as those following parenteral administration, and decreased

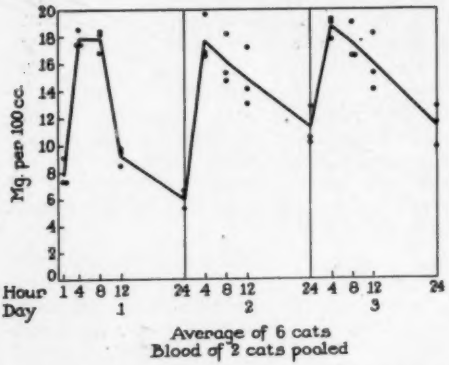


Fig. 4—Free sulfamethazine blood concentrations in cats.
Dose (single oral dose): first day—1 gr./lb. of body weight; second and third days—½ gr./lb. of body weight.

more slowly, due to slow absorption of the drug from the intestine. Effective blood concentrations were maintained throughout the test.

Blood concentrations of sulfamethazine in cats following subcutaneous administration are shown in figure 3. Maximum concentrations were recorded at about the fourth hour each day and then decreased gradually. Levels attained after each subsequent dose equalled approximately those following the initial higher dose. Levels well above those ordinarily considered effective were maintained through twenty-four hours of each day.

The results of oral drug administration in cats are shown in figure 4. The levels increased and decreased less rapidly, and higher levels were attained on each day of the test.

## SUMMARY

1) Sulfamethazine was administered to normal dogs and cats, parenterally (subcutaneously) and orally, and blood concentration determinations were made at regular intervals.

2) Blood concentrations considered bacteriostatically effective were maintained in dogs at a dosage of 1½ gr./lb. of body weight on the first day and 1 gr./lb. on subsequent days, and in cats at a dosage of 1 gr./lb. on the first day, and ½ gr./lb. on subsequent days.

3) No evidences of toxicity of the drug at the dosages used were noted.

### References

[1]Marshall, E. K., Jr.: Bacterial Chemotherapy. Phys. Rev., *19*, (Apr., 1939): 240.

[2]Marshall, E. K., Jr.: Experimental Basis of Chemotherapy in the Treatment of Bacterial Infections. Bull. N. Y. Acad. Med., *16*, (Dec., 1940): 723.

[3]Marshall, E. K., Jr.: The Significance of Drug Concentration in the Blood as Applied to Chemotherapy. Presented at Section on Microbiology, N. Y. Acad. Med., March 25, 1948.

[4]Northey, E. H., The Sulfonamides and Allied Compounds. Reinhold Pub. Corp., New York, N. Y., (1948): 560.

[5]Welsh, M., Schroeder, C. R., Vroman, D. F., Reddin, L., Burkhart, R., and Langer, P.: The Fate of ½ gr./lb. Body Weight of Seven Sulfonamides in Seven Animal Species. Proc. U. S. Livestock Sanitary A., 50th Ann. Meeting, (1946): 213.

[6]Kiser, J. S., Waters, M. K., Wirshup, M. I., and Bottorff, C. A.: Sulfonamide Blood Concentrations in Chickens and Turkey Poults. Poult. Sci., *27*, (March, 1948): 219.

[7]Schmidt, L. H., Hughes, H. B., Badger, E. A., and Schmidt, I. G.: The Toxicity of Sulfamerazine and Sulfamethazine. J. Pharmacol. and Exptl. Therap., *81*, (May, 1944): 17.

[8]Francis, J.: Bacterial Chemotherapy in Veterinary Medicine. Vet. Rec., *59*, (March 22, 1947): 131.

[9]Langer, P. H., Burkhart, R. L., Schroeder, C. R., and Welsh, M.: Sulfamethazine Blood and Milk Concentrations in Dairy Cows: J. Dairy Sci., *31*, (Feb., 1948): 103.

[10]Burkhart, R. L., Schroeder, C. R., Welsh, M., and Langer, P. H.: Sulfamethazine Blood Concentrations in Swine. Vet. Med., *43*, (Feb., 1948): 80.

[11]Schroeder, C. R., Welsh, M., Langer, P. H., and Burkhart, R. L.: Sulfamethazine Blood Concentrations in Horses. J. A. V. M. A., *113*, (May, 1948): 381.

[12]Langer, P. H., Poppensiek, G. C., Schroeder, C. R., Burkhart, R. L., and Welsh, M.: Sulfonamide Blood Concentrations in Mink. Vet. Med., *43*, (Jan., 1948): 26.

[13]Bratton A. C., and Marshall, E. K., Jr.: A New Coupling Component for Sulfanilamide Determination. J. Biol. Chem., *128*, (May, 1939): 537.

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*Toxicology of BHC.*—Tests in Spain indicated that benzene hexachloride (BHC) is less toxic than DDT to warm-blooded animals, including man *(Rev. Applied Entomol.*, July, 1948). Its toxicity to insects, according to this report, is thought to be due to its similarity to inositol, and it is suggested that its ability to penetrate the integument which has been attributed to the chloroform group of the molecule, may be due to the benzene radical.

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Although not yet available on the open drug market, the sale of streptomycin amounted to $35 million last year.

# A New Treatment for Ascariasis in Dogs and Cats

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INTESTINAL parasites in domestic animals are a cause of major loss. The problem has been to find an agent possessing high activity against the parasite, which has a protoplasmic makeup similar to that of the host, without injuring the host. Caricide* (diethylcarbamazine dihydrogen citrate),** known as hetrazan* in human medicine, exerts such a selective action, and represents a new chemotherapeutic agent in the treatment of ascariasis in dogs and cats. In addition, this drug is now undergoing extensive trials in a variety of parasitic diseases of man and animals.

The history of the drug dates back to World War II when an intensive research program was undertaken in an attempt to find a drug effective against filariasis in man, a disease which threatened our armed forces stationed in the endemic areas of the Pacific theater. Approximately 1,000 drugs were tested against naturally acquired filariasis in cotton rats and dogs.

## LITERATURE

Caricide has recently been shown to possess activity against *Litomosoides carinii*, the filarial worm, in cotton rats,[1, 2] *Dirofilaria immitis*, the dog heartworm,[1, 2] adult *Trichinella spiralis*, the trichina worm, in white rats,[3] and *Wuchereria bancrofti*, the filarial worm of man.[4] An important feature of the drug is that it is active when given orally as well as parenterally.

Recent studies[5] have demonstrated that caricide produces a marked antiascarid effect in dogs. Fifty-one ascarid-infected dogs were divided into eight groups; dosages varied from 12.5 mg./kg. to 50 mg./kg., given once or twice within twenty-four hours, orally, in seven groups, and 50 mg./kg. intraperitoneally, given twice within twenty-four hours in one group.

TABLE I—Antiascarid Effect of Caricide in Cats

| Cat (No.) | Oral dosage (mg./kg.) | Weight of cat (kg.) | No. of ascairds passed 0-24 hr. | 24-48 hr. | 48-72 hr. | 72-96 hr. | Total ascarids passed | Day of autopsy | Ascarids recovered at autopsy (No.) | Ascards removed by caricide (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 25-1 dose | 2.0 | .. | 3 | .. | .. | 3 | 5 | 0 | 100 |
| 2 | 25-1 dose | 2.9 | 37 | 3 | .. | .. | 40 | 5 | 2 | 95 |
| 3 | 25-1 dose | 3.9 | 12 | .. | .. | .. | 12 | 5 | 4 | 75 |
| 4 | 25-1 dose | 2.6 | .. | .. | 1 | .. | 1 | 5 | 1 | 50 |
| 5 | 25-1 dose | 3.2 | .. | 4 | .. | .. | 4 | 5 | 0 | 100 |
| 6 | 25-1 dose | 3.9 | 13 | .. | .. | .. | 13 | 5 | 0 | 100 |
| 7 | 25-1 dose | 4.0 | .. | .. | 3 | .. | 3 | 5 | 0 | 100 |
| 8 | 25-2 doses* | 3.2 | 6 | 1 | .. | .. | 7 | 10 | 1 | 88 |
| 9 | 25-2 doses* | 2.9 | .. | .. | .. | 2 | 2 | 10 | 0 | 100 |
| 10 | 25-2 doses* | 1.6 | 3 | .. | .. | .. | 3 | 10 | 0 | 100 |
| 11 | 25-2 doses* | 2.8 | .. | .. | 6 | .. | 6 | 10 | 0 | 100 |
| 12 | 25-2 doses* | 1.0 | 9 | .. | 33 | .. | 42 | 10 | 0 | 100 |
| 13 | 25-2 doses* | 0.7 | .. | .. | 3 | .. | 3 | 10 | 0 | 100 |
| 14 | 50-1 dose | 2.0 | 2 | 2 | .. | .. | 4 | 5 | 0 | 100 |
| 15 | 50-1 dose | 2.5 | .. | 9 | .. | .. | 9 | 5 | 0 | 100 |
| 16 | 50-1 dose | 3.5 | 1 | 1 | .. | .. | 2 | 5 | 0 | 100 |
| 17 | 50-1 dose | 3.0 | 1 | 3 | .. | .. | 4 | 5 | 0 | 100 |
| 18 | 50-1 dose | 4.0 | .. | .. | 10 | .. | 10 | 5 | 0 | 100 |

*2 doses = a single oral dose in the morning and a single oral dose in the afternoon.

Fasting prior to treatment, or purgation following treatment, was not practiced. Ascarids were passed within a few hours to four days after dosing. The authors found that the most effective oral doses were 25 mg./kg. given twice, or 50 mg./kg. given once. All of the ascarids were removed in all the dogs given two doses within twenty-four hours of 25 mg./kg., and all of the ascarids were removed from all but 1

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The author is indebted to Mr. Harold Cole, Animal Industry Section, for aid in the conduct of the program, and to Dr. R. Hewitt and Mr. W. Wallace, Research Section, for their interest and coöperation in the project.

*Reg. U. S. Patent Office.

**Chemical abbreviation for 1-diethylcarbamyl-4-methyl piperazine dihydrogen citrate.

dog receiving one dose of 50 mg./kg. The remaining dog had retained 1 ascarid. It is of special interest that two doses of 50 mg./kg. within twenty-four hours given *intraperitoneally* removed all of the ascarids in the 4 dogs tested.

Preliminary data[5] from 6 human patients indicate that hetrazan (caricide) possesses activity against *Ascaris lumbricoides* in man.

Data obtained in the treatment of 26 kittens and cats infected with ascarids and treated with caricide form the major subject of this report.

## EXPERIMENTAL

Cats of varying sizes and ages, shown to be harboring ascarids on the basis of microscopic fecal examination, were used in this study.

**TABLE 2—Summarized Data From 18 Cats Treated for Ascariasis with Caricide**

| Dose (mg./kg.) | Cats (No.) | Total ascarids passed | Ascards found at autopsy | Ascards removed by caricide (%) |
|---|---|---|---|---|
| 25 oral 1 dose | 7 | 76 | 7 | 91.5 |
| 25 oral 2 doses | 6 | 63 | 1 | 98.5 |
| 50 oral 1 dose | 5 | 29 | 0 | 100.0 |

In the first experiment, 18 cats varying in weight from 0.7 kg. to 4.0 kg. were divided into three groups. The cats were placed in individual cages fitted with wire floors and removable drop pans. Each animal in group 1 was given one oral dose of 25 mg./kg.; those in group 2 were given two oral doses of 25 mg./kg. within twenty-four hours; and those in group 3 were given one oral dose of 50 mg./kg. The animals were neither fasted prior to treatment nor given a purgative after treatment. Following treatment, the cages were examined several times daily, and the feces were screened for the presence of eliminated worms. Autopsies were performed on all animals from the fifth to the tenth day after treatment.

The results obtained are given in detail in table 1 and summarized in table 2. The elimination of ascarids began within a few hours after dosing. A total of 168 worms was passed on all doses. The most effective doses were either two doses of 25 mg./kg., or one dose of 50 mg./kg. At two doses of 25 mg./kg., all of the worms were eliminated in all but 1 of the animals. This cat had passed 5 ascarids and retained 1. At the dose of 50 mg./kg., all ascarids were eliminated in all cases treated.

In view of the excellent results obtained in the first experiment, particularly in the group receiving one dose of 50 mg./kg., another group of 8 kittens was placed on experiment. The dosage employed was 25 mg./lb. of body weight given as a single dose. This is slightly more than 50 mg./kg., but represents a dosage schedule more conveniently adapted to field practice, and obviates the necessity on the part of the practitioner to convert animal weights from pounds to kilograms in calculating dosage.

The cats ranged in weight from 2.3 lb. to 3.5 lb.; all were ascarid positive as shown by fecal examination. The method of handling and the observations were similar to those described in the first experiment. Autopsies were performed on the fourth day after treatment.

The results obtained are given in table 3. All of the ascarids were removed from all of the animals but 1. This case passed 5 ascarids and retained 1. Ninety-five per cent of the ascarids eliminated were passed within the first twenty-four hours. At the end of the seventy-second hour, 97.5 per cent of the total number of ascarids present in all cases had been eliminated. Since, as shown in previous experiments, ascarids were sometimes passed between the seventy-second and ninety-sixth hour after treatment, there is the possibility that the 1 remaining ascarid may have been passed had the experiment been prolonged an additional twenty-four hours.

## TOXICITY

Reports on toxicity studies with caricide show the drug to be essentially nontoxic. Dogs treated for thirteen days with 50 mg./kg. twice a day and for as long as two months with 25 mg./kg. given three times a day showed[2] no significant symptoms other than occasional and transient vomiting on the first few doses only. Results of histopathologic studies of such

**TABLE 3—Antiascarid Activity of Caricide in Kittens**

| Cat (No.) | Oral dosage (mg./lb.) | Weight of kittens (lb.) | No. of ascarids passed 0-24 hr. | 24-48 hr. | 48-72 hr. | Total ascarids passed | Day of autopsy | Ascarids recovered at autopsy | Ascarids removed by caricide (%) |
|---|---|---|---|---|---|---|---|---|---|
| 19 | 25 | 3.5 | 4 | .. | .. | 4 | 4 | 0 | 100 |
| 20 | 25 | 2.5 | 5 | .. | 2 | 7 | 4 | 0 | 100 |
| 21 | 25 | 2.8 | 5 | .. | .. | 5 | 4 | 0 | 100 |
| 22 | 25 | 3.1 | 5 | .. | .. | 5 | 4 | 1 | 83 |
| 23 | 25 | 2.8 | 4 | .. | .. | 4 | 4 | 0 | 100 |
| 24 | 25 | 2.5 | 2 | .. | .. | 2 | 4 | 0 | 100 |
| 25 | 25 | 3.0 | 3 | .. | .. | 3 | 4 | 0 | 100 |
| 26 | 25 | 2.3 | 10 | .. | .. | 10 | 4 | 0 | 100 |

cases were negative. Pharmacologic studies involving laboratory animals[7] showed that these animals could tolerate dosages far in excess of those therapeutically active in dogs and cats. In a study involving 238 mice and 260 rats, the oral $l.d._{50}$ was found to be 660 mg./kg. and 1,380 mg./kg., respectively.

Since vomition is seen in some cases when the drug is given on an empty stomach, 8 kittens, weighing from 1.5 lb. to 2.75 lb., and 7 dogs, weighing from 5.25 lb. to 11.5 lb., were given caricide after feeding to insure the presence of food in the stomach.

The kittens were given doses up to 36.6 mg./lb. body weight. None of these animals vomited or showed any abnormal symptoms over the four-day observation period. All but 1 of the animals received a dose higher than the therapeutic dose of 25 mg./lb.

The dogs were dosed with 50 mg./lb. after feeding. This constitutes twice the therapeutic dose. Vomition occurred in only 1 of the animals forty minutes after dosing. No other symptoms were observed in this animal. The other animals showed no abnormal symptoms whatsoever.

## CONCLUSION AND SUMMARY

1) Caricide (diethylcarbamazine dihydrogen citrate) is a highly effective and safe treatment for ascariasis in dogs and cats.

2) Fasting prior to treatment or purgation after treatment is not necessary to produce effective results.

3) At therapeutic levels, caricide has been found to approach 100 per cent efficiency.

4) A single oral dose of 25 mg./lb. body weight, given after feeding, produces optimum results.

### References

[1]Hewitt, R., White, E., Wallace, W., Stewart, H., Kushner, S., and SubbaRow, Y.: Experimental Chemotherapy of Filariasis. II. Effect of Piperazine Derivatives Against Naturally Acquired Filarial Infections in Cotton Rats and Dogs. J. Lab. and Clin. Med., *32*, (1947): 1304-1313.

[2]Hewitt, R., Kushner, S., Stewart, H., White, E., Wallace, W., and SubbaRow, Y.: Experimental Chemotherapy of Filariasis. III. Effect of 1-Diethylcarbamyl - 4 - Methylpiperazine Hydrochloride Against Naturally Acquired Filarial Infections in Cotton Rats and Dogs. J. Lab. and Clin. Med., *32*, (1947): 1314-1329.

[3]Oliver-Gonzales, J., and Hewitt, R.: Treatment of Experimental Intestinal Trichinosis with 1-Diethylcarbamyl - 4 - Methylpiperazine Hydrochloride (Hetrazan). Proc. Soc. Exptl. Biol. and Med., *66*, (1947): 254-255.

[4]Santiago-Stevenson, D., Oliver-Gonzales, J., and Hewitt, R.: Treatment of Filariasis Bancrofti with 1-Diethylcarbamyl-4-Methylpiperazine Hydrochloride (Hetrazan), J.Am.M.A., *135*, (1947): 708-712.

[5]Hewitt, R., Wallace, W., White E., and SubbaRow, Y.: The Treatment of Ascariasis in Dogs with 1-Diethylcarbamyl-4-Methylpiperazine Hydrochloride (Hetrazan). J. Parasitol. In press.

[6]Oliver-Gonzales, J., and Hewitt, R.: Treatment of Six Cases of Ascariasis in Man with 1-Diethylcarbamyl-4-Methylpiperazine Hydrochloride (Hetrazan). In Press.

[7]Harned, B. K., Cunningham, R. W., Halliday, S., Vessey, R., Yuda, N., Clark, M., Hine, C., Cosgrove, R., and SubbaRow, Y.: Studies on the Chemotherapy of Filariasis. VI. Some Pharmacodynamic Properties of 1 - Diethylcarbamyl - 4 - Methylpiperazine Hydrochloride, Hetrazan. J. Lab. and Clin. Med., *33*, (1948): 216-235.

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*Incidence of Human Tuberculosis.*—As of 1947, there were 500,000 clinical cases of tuberculosis with 50,000 deaths (*J. Am. M. A.*, Oct. 16, 1948). This is 36 per 100,000 as compared with 200 per 100,000 and a corresponding number of deaths forty years ago. The present morbidity was achieved by sanitary measures. In Denmark, where the BCG vaccination has been widely employed, the reduction was from 300 to 32 per 100,000. The value of sanitation and vaccination are shown in actual figures —figures that are real but not sensational.

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*Liver Flukes in Man.* — In describing a grave epidemic of distomiasis in a human family, Rossi (*Rev. méd. vét.*, 1946, abstr. *Rec. méd vét.*, Sept., 1948) asserts that the infection is more prevalent in the human being than has been supposed. No systematic research on *Fasciola hepatica* infection has ever been made. Its rarity is only apparent and, though the prognosis is grave, there is no heroic treatment as in ruminants. The mortality is about 40 per cent. Prevention depends upon controlling the disease in farm animals.

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*Thyroprotein for Laying Hens.*—Because the normal thyroid secretion rate apparently declines with advancing age and thereby limits egg production, Turner and Kempster (*Poult. Sci.*, July, 1948), have suggested that creating mild hyperthyroidism by feeding thyroprotein to aged hens is advantageous, especially in breeding flocks. Their studies showed that its use maintained the supply of thyroid hormone in the circulating blood at a uniform level that prevented the usual age-progressing decline in egg output. Apparently, the thyroid hormone stimulates the pituitary to secrete more of the gonadotrophic hormones involved in ovum and yolk production, as well as gonadic hormone (estrogen and androgen).

# Virus Vaccines

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AT ONE time, the term virus was commonly applied to infectious matter. Thus, Pasteur speaks of virus vaccines against fowl plague and microbe vaccines against anthrax. He likewise applies the term virus or the term microörganism to the infectious matter of rabies. In the course of time,

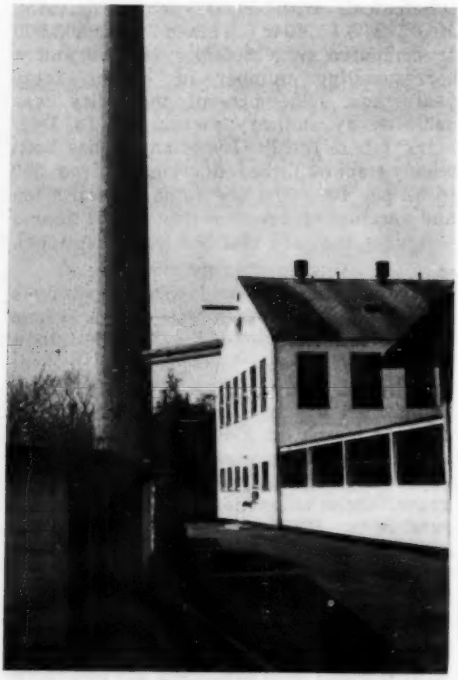

**Fig. 1—The foot-and-mouth disease laboratories in Copenhagen. On the first floor are the laboratories and rooms for preparation of vaccine. Through the canal, which goes from the building into the chimney, the air is drawn out from the rooms where the virus is used. The high temperature in the chimney destroys all virus drawn into it.**

however, scientists differentiated between the actual viruses and the bacteria and protozoa, regarding them as a rather limited group of infectious matter. Actually, the viruses have in many respects a closer resemblance to enzymes and especially toxins than to bacteria. This is not only true physicochemically but also as far as immunization is concerned. Accordingly, in recent years, biologists and immunologists have been inclined to regard virus as protein, though many biologists and especially physicians have found it difficult to reconcile this idea with the multiplication of virus in the organism. A chemist, however, will consider the development of the disease as an autocatalytic process, similar to those which are known in the case of enzymes. The virus that enters the organism and then sets the disease process in action might, very roughly, be compared with the spark that ignites a fire.

We shall not here discuss the two different conceptions of the nature of the virus species. In fact, this question is a minor one in connection with the purely practical problem, namely, the preparation of suitable virus vaccines.

The classic example of the prophylaxis of virus diseases is the jennerian cowpox vaccination. Jenner's vaccine is the result of a remarkable observation utilized in a brilliant way.

Practice preceded theory, and Jenner himself could have given no scientific explanation of the strange phenomenon that people who had recovered from cowpox were immune to smallpox. Not until many years later was it possible experimentally to convert smallpox virus into cowpox virus by passage from man to rabbits and then to calves. Until recently, a few investigators have even doubted that the two virus species are actually identical, pointing to the fact that the metamorphosis—cowpox virus-smallpox virus—never has been successfully performed.

The first virus vaccine that was produced on a strictly scientific basis was the vaccine against rabies, first tested in 1886. Pasteur, Roux, and Chamberland succeeded, by repeated passages in rabbits of the so-called "street-virus," *i.e.*, brain tissue from a dog that died from rabies, in obtaining a virus that was greatly attenuated relative to the

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initial material. They obtained a further detoxication by drying, for varying periods, this rabbit virus which they called *Virus fixe*. Rabbit virus had thus become less dangerous to dogs and human beings, but had retained its ability to immunize against rabies.

Occasionally it happens, however, that while a virus transferred from one animal to another becomes less virulent in the case of the original animal species, at the same time it loses its ability, at least in part, to produce immunity in the organism from which it originally was isolated. As an example, in 1920, Waldmann and Pope succeeded in transferring foot-and-mouth disease virus from cattle to guinea pigs. The virus then isolated from the guinea pigs proved to be less virulent in cattle than cattle virus (at any rate after several passages). But when considerable doses of guinea-pig virus were injected into cows, these cows were immune to a later inoculation with cattle virus. Conversely, guinea pigs treated with vaccines produced from cattle virus proved to be only relatively protected or not protected at all when later inoculated with highly virulent guinea-pig-passage virus. A similar phenomenon is known in the case of influenza. Influenza virus can, as we know, be transferred from man to ferret and then to mouse. It is possible to produce vaccines capable of protecting against the homologous virus type. But in order to vaccinate a ferret successfully, one must employ ferret vaccine as initial material, and a mouse can be protected only when employing vaccine produced from mouse virus. It seems, though, that the most recently produced viruses, which have been cultivated in the allantoic fluid of eggs as initial material, possess strong immunizing properties.

The principles of Jenner and Pasteur cannot be applied directly to the preparation of vaccine in general. Moreover, in both cases the vaccine contained active virus, *i.e.*, in the vaccination there could occur a multiplication of virus in the animal. It is well known that vaccination against smallpox or rabies, occasionally is accompanied by unpleasant or dangerous, even fatal, secondary effects (encephalitis, Landry's paresis).

## CHEMICAL SUBSTANCES USED IN VACCINES

It is therefore natural to have endeavored to produce vaccines containing no demonstrable active virus, but nevertheless possessing a sufficiently strong immunizing power. In this connection, chemical substances have been employed which, in suitable dilution, have been added to the virus suspension. The idea is not new. Pasteur, Roux, and Chamberland employed potassium dichromate to attenuate the anthrax bacillus, and this very method was applied to the vaccine in the famous experiment at Pouilly-de-Fort.

In more recent years, particular promi-

Fig. 2—Apparatus employed in the preparation of vaccine.

nence has been attached to one chemical compound, namely formaldehyde. This substance has, to a remarkable degree, proved to be suitable in the inactivation of virus in a way so gentle that the antigenic properties, at least partly, are preserved. Another chemical substance which has proved most serviceable in the preparation of virus vaccine is aluminum hydroxide. Its effect is not actually inactivating, like that of formaldehyde, but by absorbing virus to a high degree it causes a reduction of the pathogenicity, and at the same time it strongly stimulates the immunity, a phenomenon which as yet has found no satisfactory explanation. I shall deal in more detail with the action of formaldehyde and aluminum hydroxide.

FORMALDEHYDE

The chemical properties of formaldehyde are well known, and the enormous value of the condensation products of formaldehyde and other chemical compounds, especially phenol, to the industry is difficult to measure. That formaldehyde is capable of detoxifying toxins was discovered as early as 1898, by Salkovski. He does not seem to have investigated whether these detoxified toxins were capable of immunizing animals. Glenny, however, reports as early as 1904 that he was successful in using diphtheria toxin in immunizing horses, the toxin having been greatly attenuated by formaldehyde. Since about 1920, Glenny and his coworkers have studied the action of formaldehyde.[1]

At about the same time, Ramon at the Pasteur Institute began a study of the same problem. In 1924, Ramon reported that he had succeeded in preparing a completely innocuous compound by treating diphtheria toxin with formaldehyde under the application of heat. Ramon called this new compound anatoxin, and demonstrated that the conversion of toxin to anatoxin only affects the toxic properties of the toxin, which means that the anatoxin should possess an immunizing power as great as the toxic toxin. Comparative investigations which I have carried out at the State Serum Institute, Copenhagen, on the immunization of horses have, on the whole, confirmed the findings of Ramon.

We know that several other toxins, e.g., tetanus toxin, gas gangrene toxin, and scarlatina toxin, likewise can be detoxified by means of formaldehyde and that the resulting anatoxins are excellent antigens. Our knowledge regarding the processes involved in the anatoxin formation is quite limited, but experiments have shown that the reaction velocity of the process increases when the hydrogen ion concentration declines. If one employs a highly purified diphtheria toxin, prepared by absorption on aluminum hydroxide and subsequent elution with sodium phosphate according to the method of Linderstrom-Lang and S. Schmidt,[2, 4] and if pH is 6 or less, then the process (toxin to anatoxin) will apparently not proceed at all. Thus, we have been able to heat toxin together with formaldehyde to 37 C. for a whole week without observing any reduction of the toxic properties of the toxin. But, if the same mixture of toxin and formaldehyde is adjusted to pH 8.5 before the heating, then it will be almost impossible in a week's time to demonstrate any toxic properties of the mixture. Thus, the process closely resembles the one that occurs between amino acids and formaldehyde, but it should be emphasized that the process toxin→formaldehyde-anatoxin, as distinct from the process just mentioned, is *not* reversible. We have carefully investigated this phenomenon, but have in no way succeeded, either by changing the pH or by dialysis, etc., to demonstrate any toxic properties of the formaldehyde-treated toxins.

Since, as mentioned, the virus species present several points of resemblance with the toxins, it seems natural to try to detoxify various viruses with reference to the preparation of vaccines. This has been partly successful. During the years 1925 to 1930, Vallee, Carré, and Rinjard published[1] some experiments which seem to show that by treating foot-and-mouth disease virus with formaldehyde, it should be possible to obtain a detoxified virus which is still capable of immunizing cattle against the disease. But the results in guinea pigs were poor. At about the same time, the English investigators Bedson, Maitland, and Burbury conducted experiments on the effect of formaldehyde on foot-and-mouth virus. They worked primarily with guinea pigs. They started with a highly virulent virus which they diluted in buffer salt solution and then filtered through a bacteria-retaining filter; then they added formaldehyde and heated the mixture for forty-eight hours at 26 C. By this treatment, the virus was completely inactivated. However, intramuscular inoculation in guinea pigs produced a relative immunity in the animals. (This was accomplished by one large or, still better, several small doses administered at suitable intervals.) When inoculated with highly virulent virus, they showed a reaction at the place of inoculation but did not show general symptoms of the disease. A closer examination showed that immunity appeared rapidly, but that it disappeared with equal rapidity. The maximum immunity was reached four days after the vaccination, but as soon as seven days later only a little more than one-half of the animals were resistant; after fourteen days, only one-fourth; and after three weeks, none of the animals showed immunity. However, a strong and

rather prolonged immunity was obtained when injections of active virus were given after vaccination with formol-treated virus. These experimental results were in close agreement with those obtained by Dunkin and Laidlaw with distemper. Here, too, cautious formaldehyde-treatment of a virus-containing spleen suspension will produce vaccines which give a relative but brief protection. For this reason, according to Dunkin and Laidlaw, one must add an injection of active virus.

Results similar to those mentioned here can be obtained in the case of other virus diseases, but in several instances it seems as if even a cautious treatment of virus with formaldehyde destroys not only the pathogenic but also the immunizing properties. Thus, J. Ørskov, S. Schmidt,[5] and Else Steenberg, attempted to prepare a vaccine against fowl plague by treating highly virulent brain suspension with formaldehyde. They succeeded in making the virus harmless so that it could be injected without any risk into both mice and chickens, but the treated animals did not develop immunity. The action of formaldehyde may also be very dissimilar when toxins and similar poisons are concerned. Thus, certain snake poisons contain different toxic compo-

cal reactions, e.g., abscesses, which appeared in connection with the immunization, might have a stimulating effect on the immunity. Thus, Thorvald Madsen found many years ago that a horse, which was being immunized against tetanus and which developed a carbuncle at the place of injection, reacted in such a way that there was formed an antitoxin titer so high that its equal at that time had never been observed anywhere. Ramon later had the same experiences with respect to immunization of horses against diphtheria, observing that animals which during the immunization developed abscesses at the place of injection showed a higher titer than those which absorbed the antigen without noticeable reaction.

*Experimental.*—After Linderstrom-Lang and I had shown that aluminum hydroxide adsorbs diphtheria toxin and binds it very firmly so long as no special elution agents (especially phosphates) are added,[2] I tested the effect of such adsorbates on the animal organism. We prepared an adsorbate consisting of a relatively small amount of toxin and a large excess of aluminum hydroxide. The adsorbate was carefully washed several times until the washing water contained not the slightest trace of toxin, which was determined by intracutaneous in-

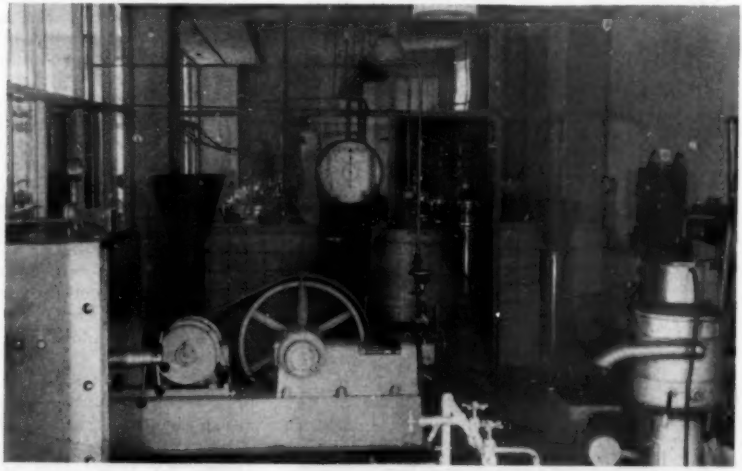

Fig. 3 — Apparatus employed in the preparation of vaccine.

nents, and all these cannot readily be detoxified by formaldehyde.

All told, it may be said that formaldehyde has proved capable of detoxifying both toxins and ultraviruses, and that the resulting compounds possess pronounced immunizing properties. However, the immunity in many instances is too weak and too short-lived to be of any practical importance for producing sure and lasting protection against the particular infection.

*Reactions.*—It has long been known that local

oculation of white rabbits, a test that will disclose the presence of amounts as small as about 1:3,000 of the fatal dose in a guinea pig (Claus Jensens' method). Using this adsorbate, rabbits and guinea pigs were injected subcutaneously, intramuscularly, intraperitoneally, and intravenously. It should be noted that the inoculated amounts contained several times the amount of toxin which, when injected without aluminum hydroxide, was capable of killing the animals under acute intoxication.

The inoculated animals responded as follows:

Those which were inoculated intravenously or intraperitoneally died within forty-eight hours, just as the control animals; the majority of those which were injected intramuscularly died too, but, on the average, after several days had elapsed. A few survived without any signs of intoxication. The animals inoculated subcutaneously survived all injections without signs of intoxication. It was now interesting to observe that these animals when later inoculated with a large dose (about 10 times the minimal lethal dose) of diphtheria toxin proved to be immune.

This latter experiment was then repeated, but this time with an adsorbate which instead of toxin and aluminum hydroxide contained a corresponding amount of anatoxin plus the same amount of aluminum hydroxide. Here, too, the treated animals proved to be immune against an injection of diphtheria toxin. Animals which were treated with a corresponding amount of anatoxin, diluted in salt solution, showed no immunity. In other words, the aluminum hydroxide had been able, to a certain extent, to prevent the toxin from exerting its toxic power, while also stimulating the production of a measurable amount of antigen. While under normal circumstances it was unable to produce any demonstrable immunity, it was now able to make the animals resistant to an injection of the toxin. A closer investigation of the effect of the aluminum showed that a given amount of antigen, when injected together with a suitable amount of aluminum hydroxide, was fortified almost 100 times in its immunizing action. The aluminum hydroxide is now part of all the anatoxins used in vaccination against diphtheria in Denmark.

Fig. 4—Containers in which the transformation of virus vaccine is made.

We observed a rather interesting effect of the aluminum hydroxide when treating mice with diphtheria toxin. Mice are known to be immune to diphtheria toxin. One may inject large amounts of a strong toxin into the mouse without producing any signs of intoxication. Mice possess a natural immunity, the tissues containing no antitoxin nor being able in other ways to neutralize the toxin. On the other hand, mice treated with a considerable amount of diphtheria toxin will not form antibodies against this antigen. If, however, aluminum hydroxide is added to the toxin, and the mixture then injected subcutaneously into mice, it is possible to demonstrate a considerable amount of antitoxin in the animals. In some cases we have been able to measure up to 10 units per cubic centimeter of serum, which is a very high titer, inasmuch as guinea pigs and rabbits, which are relatively good antitoxin producers, rarely reach this height.

### HYDROXIDES

It has long been known that ultravirus is adsorbed by various substances, e.g., carbon, kaolin, and metal hydroxides. However, no attempts to produce active immunization with such adsorbates had been made until 1931. At this time, Rhoads reported, simultaneously with our publications on the immunizing action of toxin and anatoxin adsorbates,[5] that he had succeeded in immunizing monkeys against poliomyelitis by means of a virus with aluminum hydroxide added.

At about this time, Ørskov and I studied the behavior of a series of virus species in the presence of aluminum hydroxide.[6] We investigated vaccinia virus, rabies virus, herpes virus, Aujeszky's virus, and, especially, fowl plague virus. We found that all could be adsorbed by aluminum hydroxide with the greatest of ease. In contrast to the toxins, however, it was very difficult to eluate virus again, even when employing the most suitable elution agent, e.g., secondary sodium phosphate. This can only mean that the binding in this case is much firmer, and one should therefore have a still better chance of utilizing the immunizing action of the adsorbate.

*Experimental.*—In our experiments with fowl plague, we first employed a virus strain that was isolated in Holland by Nieschulz and Bos, which possessed the peculiar property of pro-

ducing a fatally progressive infection in mice, even when injected subcutaneously. The previously isolated strains had been capable of infecting mice only when the injection was subdural. As virus material, we employed brain tissue from mice which had died after such an injection. This brain tissue was cautiously ground with quartz powder and sterile salt solution. Then the suspension was centrifuged, treated with aluminum hydroxide, again centrifuged, and washed three times with salt solution. The sediment was next suspended in salt solution, and this suspension was used for subcutaneous injection.

Mice, having received an injection with this adsorbate, behaved as follows: Some animals died with typical symptoms of fowl plague infection within the same time as the control animals which had received virus alone. Others showed distinct signs of infection, but did not die until some time had passed, in a few instances up to several weeks after the inoculation. About 50 per cent of the animals survived without signs of infection. These animals were later tested with a large amount of virus, which under normal conditions was capable of killing untreated animals. One-half of the vaccinated animals survived this test.

It has been mentioned that we did not succeed in preparing an active vaccine by treating fowl plague virus with formaldehyde. We next tried to heat the virus suspension in a thermostat (37 C.) long enough (about one week) so that the pathogenic properties would disappear; we then investigated whether this treatment had produced an active vaccine. This was not found to be the case. Virus suspensions which, after heating, had lost their pathogenicity had at the same time lost their ability to immunize. We then stored suspensions of virus to which aluminum hydroxide had been added in the thermostat. The adsorbates treated in this way were found to be consideraby more permanent than virus alone, and we found that the immunizing properties disappeared much more slowly than the pathogenic properties. It was possible to immunize mice with the aid of repeated injections of virus adsorbates which had been made nonpathogenic by treatment. We likewise tried the effect of these adsorbates in chickens. Here, too, we succeeded in obtaining an immunity without producing the disease. It was even found that some animals which had received only a single injection of such virus adsorbates nevertheless became immune and withstood an inoculation of more than 10,000 times the virus dose capable of producing a fatally progressing infection in untreated chickens.

So far, it had not been possible to immunize chickens to fowl plague with absolute certainty. It was claimed that even if a degree of immunity was obtained, which enabled the animals to withstand a subcutaneous or intracutaneous inoculation with virus, they would still be infected if virus were injected directly into the brain. In order to determine whether the vaccine prepared by us could protect under all conditions, we inoculated 25 vaccinated and 25 unvaccinated chickens with an amount of virus corresponding to 10,000 infective doses. A group of 5 vaccinated chickens and 5 control chickens was inoculated subcutaneously with virus, another group was treated intracutaneously, a third group intramuscularly, a fourth group intravenously and, finally, a fifth group intracerebrally. The 25 untreated chickens died from typical fowl plague infection within three to four days, regardless of the inoculation technique employed, while all the vaccinated chickens survived the inoculation. A few showed very slight, passing symptoms but soon were normal again.

Since passage virus originating from mice was employed here, both in the preparation of the vaccine and in the immunity test, we considered it important to apply a highly virulent fowl plague virus which had never been transferred to mice but which had been passed exclusively from chicken to chicken.

For this purpose, we gave the 25 chickens which had proved resistant to the preceding inoculation an injection of the new virus. The animals were divided into five groups, so that the injection technique could be varied in the same way as before. None of the vaccinated birds showed the slightest sign of disease following the inoculation, while the 25 control chickens, similarly treated, all died in the course of two or three days from typical fowl plague infection.

### FOOT-AND-MOUTH DISEASE VACCINE

On the basis of the encouraging results which we obtained with the immunization against fowl plague, we began a series of investigations concerning a possible vaccination against foot-and-mouth disease according to similar principles. It has been mentioned that by means of formol-treated virus it was possible to obtain a specific but brief immunity. The first investigations were carried out by Schmit-Jensen, Albert Hansen, and S. Schmidt,[7] at the foot-and-mouth disease research laboratory at Lindholm. We soon were able to establish that foot-and-mouth virus is adsorbed very easily by aluminum hydroxide, and that the binding is especially stable since only infinitesimal amounts of virus could be eluated by means of secondary phosphate.

The first investigations involved highly virulent guinea-pig virus in the form of lymph which was centrifuged at 3,000 r.p.m. Different adsorbates were prepared, containing various amounts of lymph. These adsorbates were injected subcutaneously into guinea pigs. The result of these experiments was that some of the animals developed generalized foot-and-mouth disease, while others showed no symptoms of the disease. The latter animals were

then inoculated intracutaneously with highly virulent guinea-pig lymph. Only a very few showed immunity, but this immunity was on the other hand so strong that there occurred only an abortive reaction at the place of inoculation. We assumed that the irregular results might be due to the circumstance that the lymph was not absolutely uniformly distributed in the aluminum hydroxide, so that lumps of virus occurred which, when the adsorbate was injected into the animals, would be able to break loose and thus cause an infection. In a new experimental series we therefore followed a different procedure. The lymph was centrifuged for fifteen minutes at 15,000 r.p.m. in a centrifuge equipped with a cooling system. The clear lymph was diluted with 10 parts of $CO_2$-free distilled water, and after standing for a short time—during which a slight, white sediment was formed, presumably consisting of euglobulin—was centrifuged once more in the same manner. Then 90 parts aluminum hydroxide were measured in a glass cylinder in which was placed an electrically driven stirrer. This stirrer was started, and the virus dilution was now added drop by drop from a burette under constant stirring. The stirring continued for an additional thirty minutes, whereupon the adsorbate was transferred to small vacuum containers of Jena glass equipped with a cannula.

Using this adsorbate, 20 guinea pigs were inoculated subcutaneously with 1 cc. twice, with an interval of fourteen days. None of the animals showed any signs of foot-and-mouth disease following the first or the second injection. Four weeks after the last injection, all the animals, together with 20 untreated controls, were inoculated with highly virulent virus so that each received a dose corresponding to 200,000 times the amount of virus capable of producing generalized foot-and-mouth disease in susceptible guinea pigs. All the untreated animals developed generalized foot-and-mouth disease. None of the vaccinated animals developed this disease; a few of them were even totally immune, showing no reaction at the site of inoculation. In most, we observed local blisters of varying intensity, ranging from pinhead-size to large blisters that covered the site of inoculation, *i.e.*, one of the plantae.

A smaller experiment was made on calves which were exposed to contact infection after vaccination. That they did possess some immunity was evident partly because they were only slightly attacked and partly because it was possible to demonstrate virus-neutralizing antibodies in their blood. One must remember that this was a case of guinea-pig virus which experience shows produces only an incomplete immunity in cattle. Later experiments, by Toussieng and by Waldmann,[8] with adsorbates prepared from cattle virus, showed that several of the animals developed generalized foot-and-mouth disease following the treatment. Our own continued experiments showed, however, that a few guinea pigs also could develop foot-and-mouth disease, even when treated subcutaneously with adsorbates containing active virus. Relying on our own experience, we, therefore, tried to heat the virus adsorbates to 37 C. We found that heating for forty-eight hours regularly produced such an attenuation that the adsorbates in question now were unable to produce foot-and-mouth disease, even when injected intracutaneously into guinea pigs. With such adsorbates, we were nevertheless able to produce an immunity just as strong and as lasting as that obtained with adsorbates containing active virus. It was necessary, in order to obtain this effect, to use considerably larger doses of the inactivated than of the fresh adsorbates. The immunity which we obtained in this way in guinea pigs came very close in strength and duration to the immunity of an animal that has passed through an attack of the disease.

We finally studied the immunizing effect of a formol-treated virus, prepared according to the method employed by the English investigators in connection with aluminum hydroxide. Two different series of experiments were carried out. In one series, we simply added aluminum hydroxide to the formol vaccine; in the other, the virus from the vaccine was adsorbed by aluminum hydroxide, *i.e.*, the sediments were centrifuged, washed, and suspended to the original volume. The experiments showed that these vaccines, too, had an excellent effect, resulting in an immunity that was both strong and lasting. As is well known, Waldmann and Köbe have demonstrated that cattle virus can be converted by means of formol and addition of aluminum hydroxide into a vaccine that protects cattle against foot-and-mouth disease.

### References

[1]Glenny, A. T., Pope, C. G., Waddington, Hilda, and Wallace, U.: Immunological Notes. J. Path. & Bact., *28*, (1925): 333.

[2]Linderstrom-Lang, K., and Schmidt, S.: Om Rensning af Toksiner af Antitoksiner. C. R. Lab. Carlsberg, *18*, (1930).

[3]Schmidt, S.: Sur la toxicité des toxines additionnées d'hydroxyde d'aluminium ou de tapioca. C. R. Soc. Biol., *107*, (1931): 330.

[4]Schmidt, S.: Sur l' importance de la composition de la toxine diphtérique pour la production du sérum antidiphtérique. Acta path. et Microbiol. Scandinavica, *12*, (1935): 7.

[5]Schmidt, S., and Ørskov, J.: Eksperimentelle Studier over Honsepest. Maanedsskrift f. Dyrlæger, *47*, (1935): 145.

[6]Schmidt, S., and Ørskov, J.: Adsorption du virus de la Peste Aviaire par l'hydroxyde d'aluminium. Acta path. et microbiol. Scandinavica, *12*, (1935): 262.

[7]Schmidt-Jensen, H. O., Schmidt, S., and Hansen, A.: Immunisation active du cobaye contre la fièvre aphteuse au moyen du virus "non atténué" combiné avec l'hydroxyde d'aluminum. Rev. Imm., *2*, (1936): 359.

[8]Waldmann, O., and Reppin, K.: Experimentelle Untersuchungen zur aktiven Immunisierung gegen Maul- und Klauenseuche. Z. f. Infektionskrankh, etc. d. Haustiere, *47*, (1935): 283.

# NUTRITION

## Biotin-Pantothenic Acid Interrelationship and Enteritis in the Pantothenic Acid Deficient Pig

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As early as 1938, Hughes[1] reported that the addition of a rice bran filtrate to a purified diet containing thiamine, riboflavin, and nicotinic acid resulted in more rapid and economical growth in the pig. The rice bran filtrate was a good source of what was then known as the filtrate factor. Later, Hughes[2] reported that young pigs fed a diet deficient in pantothenic acid developed subnormal appetites at an early stage, grew slowly, became thin and emaciated, showed a lack of normal coördination, "goose stepped"; some lost their hair, and at autopsy showed gastritis and involvements of the large intestine. Wintrobe, *et al.*[3] stated that the effects of a pantothenic acid deficiency became evident, in some instances, even as soon as eleven days after feeding of a pantothenic acid deficient diet. His deficiency symptoms were similar to those reported by Hughes.[2] Wintrobe, *et al.*[3] further reported extensive colitis, and the development of a moderate normocytic anemia. They also stated that the abnormal gait was associated with well defined histologic changes in the nervous system.

Wintrobe, *et al.*,[4] and Follis and Wintrobe[6] reported that pigs, on a purified diet whose supplements did not contain calcium pantothenate, developed an abnormal gait and showed degenerative changes in the peripheral nerves, the posterior root ganglia, the posterior roots, and the posterior funiculi of the spinal cord. Also, they developed a subacute inflammation of the colon.

Hughes[5] stated that pantothenic acid deficient pigs, while standing, often have a rhythmic kicking with one hind leg and then with the other.

Emerson and Wurtz[7] reported that a biotin deficiency induced in weanling rats by the feeding of a succinylsulfathiazole-containing purified ration, may be aggravated by superimposing a deficiency of pantothenic acid. The feeding of biotin protected against these changes and, in addition, appeared to lessen the severity of the syndrome associated with a lack of pantothenic acid. When calcium pantothenate was added, there were only mild symptoms of a biotin deficiency, and the time required to produce such deficiency symptoms was extended beyond that observed in the absence of pantothenic acid.

Cunha, *et al.*[8] reported that when 30 per cent of desiccated egg white was included in a purified ration for the pig, a biotin deficiency was produced. The deficiency symptoms included alopecia, spasticity of the hind legs, cracks in the feet, and a dermatitis of the skin characterized by dryness, roughness, and brownish exudate. A similar deficiency syndrome with pigs was reported by Lindley and Cunha[9] when

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sulfathaladine was included at a 0.5 per cent level in a purified ration.

Necrotic enteritis in swine is frequently the cause of heavy death losses. Kinsley[10] stated that "It is usually designated as a filth disease; however, it occurs in swine that are kept under the best sanitary conditions."

McEwin[11] reported the occurrence of necrotic enteritis in a herd of pigs kept under sanitary conditions. He was not able to associate the condition with any specific organism and suggested that possibly the deficiency reported by Birch, Chick, and Martin[12] on a pellagra-producing diet, may have been the cause.

Madison, Miller, and Keith[13] made brief reference to the beneficial effects of nicotinic acid when fed to pigs suffering from symptoms similar to those observed by Davis, Freeman, and Madsen.[14] The latter group of workers reported that nicotinic

Fig. 1—Pig on left received the basal ration. The pig on the right received a pantothenic acid deficient ration. Both pigs weighed the same at the initiation of the experiment. Note the difference in growth, the exudate, and poor coat exhibited by the pantothenic acid deficient pig.

acid had been fed with remarkable results both as a cure and as a preventive of necrotic enteritis. Rasmussen, *et al.*[15] stated that, with induced necrotic enteritis in swine, a composite of known B-vitamins may give a better response than nicotinic acid alone in the recovery phase of the disease. Davis, Freeman, and Madsen[14] suggested that the disease, infectious necrotic enteritis, is a secondary complication caused by intestinal invasion by the organism *Salmonella choleraesuis* and probably other organisms after the symptoms of nicotinic acid deficiency have developed in the pig.

Data presented by Edgington, *et al.*[18] indicated that the protective value of nicotinic acid against *S. choleraesuis* infection was not sufficient to encourage its use as a specific preventive or curative measure for this type of bacterial infection of swine. However, they state that it should be recognized that the uncertainty which frequently surrounds the etiology of outbreaks of swine enteritis occurring under farm conditions is such that the evaluation of the influence of nutritional factors upon this disease may not yet be clearly established.

## EXPERIMENTAL

Six-week-old purebred Chester White pigs were used in this experiment. They were divided equally in each lot as to weight, sex, and age.

The basal ration used in this experiment was the same as that reported previously by Heinemann, *et al.*[17] and consisted of purified, alcohol-washed casein 26.1 per cent, sucrose 57.7 per cent, lard 11 per cent, and mineral mix 5.2 per cent. Water-soluble vitamins were fed (in mg. per kg. of live weight daily) as follows: thiamin 0.52, riboflavin 0.12, niacin 1.20, pantothenic acid 0.50, pyridoxine, 0.20, and choline chloride 10.00; fat-soluble vitamins were supplied (per pig daily) as follows: A—5,000 I.U., D—500 I.U., E—57 mg., and K—2 mg.

When the pantothenic acid deficient pigs lost their appetites and would not eat at times, the vitamins were given to them orally in capsules. Therefore, the pigs on a pantothenic acid deficient ration received the other B-complex vitamins on a bodyweight basis.

At the beginning of the experiment, a modification of the "paired-feeding technique" (Mitchell and Beadles[16]) was used in order to keep the feed intake of all pigs constant. However, as the experiment progressed, the appetite of some of the pigs decreased to such an extent and became so variable between pigs that this procedure was discontinued.

The pigs were fed in individual feeding stalls and kept on raised floors in order to prevent coprophagy. The raised floors were washed twice daily. The individual feeding stalls and raised floors are described in a previous publication by Heinemann, *et al.*[17]

To prevent the development of rancidity and consequently the destruction of certain

vitamins, the purified ration was kept in a refrigerator, and not more than two or three days' feed requirements were mixed at a time.

All vitamins were kept in a solution in a refrigerator. They were fed to the pigs every other day. The required amount of vitamins fed was measured in a calibrated pipette and placed on a small amount of the feed on the top of the ration at feeding time. In this manner, struggling with the animals was avoided, and complete consumption of the vitamins was obtained.

## RESULTS AND DISCUSSION

The data in table 1 show that the addition of biotin to a pantothenic acid deficient ration was effective in prolonging the life of the pantothenic acid deficient pigs. This is in agreement with the findings of Emerson and Wurtz[7] with rats, where the addition of biotin was effective in prolonging life when added to a pantothenic acid deficient ration containing sulfasuxidine. The 2 pantothenic acid deficient pigs (lot 2 A) lived fifty-six and sixty-seven days, respectively, while the 2 pigs that received the same ration plus biotin (lot 3 A) lived ninety and 126 days, respectively, with 126 days being the full term of the experiment. The pigs that received a suboptimal amount of pantothenic acid (lot 2 B) lived the full term of the experiment while the 2 pigs that received this amount of pantothenic acid plus biotin (lot 3 B) died after ninety-four and 114 days, respectively.

The average daily gain of the pigs lacking in pantothenic acid, in this trial, was practically nil. In fact, 2 of the pantothenic acid deficient pigs lost weight during the trial. Two of the pigs in each of the pantothenic acid deficient lots (lot 2 B and lot 3B) were fed approximately 50 μg. of Ca pantothenate per kilogram of body weight daily in order to keep them eating a little. Even then, their average daily gains were very poor as compared to the pigs fed the basal ration which included pantothenic acid.

The average daily feed consumption of the pantothenic acid deficient pigs and those that received biotin was only from ½ to ¾ lb. per pig daily. The pigs on the basal diet consumed 1½ lb. of feed per pig daily. Thus, the pantothenic acid deficiency was quite severe in decreasing appetite.

The pigs on the basal ration were very efficient in their feed utilization. They made a pound of gain on only slightly more than 2 lb. of feed. The pantothenic acid deficient pigs made very poor utilization of their feed. However, they were on barely more than a maintenance ration.

The blood hemoglobin level of the pigs was not seriously affected by the pantothenic acid deficiency. In fact, the average hemoglobin levels throughout the entire experimental period of the deficient pigs were slightly higher than those of the pigs receiving the basal diet. However, during the last three weeks of the experiment the hemoglobin levels of the pantothenic acid deficient pigs began to decline slightly as

TABLE I—The Effect of a Lack of Pantothenic Acid on Growth and Hemoglobin

| Type of ration | Basal only | Basal minus pantothenic acid | | | | Basal minus pantothenic acid plus biotin* | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | No pantothenic acid given | | Small amt. of pantothenic acid given | | No pantothenic acid given | | Small amt. of pantothenic acid given | |
| Lot No. | 1 | 2A | | 2B | | 3A | | 3B | |
| No. of pigs | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Pig No. | 10, 11, 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Initial age, weeks | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| No. of days on trial | 126 | 67** | 56** | 126 | 126 | 126 | 90** | 114** | 94** |
| Ave. initial wt., lb. | 23 | 31 | 21 | 28 | 22 | 28 | 19 | 19 | 25 |
| Ave. final wt., lb. | 114 | 35 | 18 | 40 | 37 | 30 | 17 | 35 | 27 |
| Ave. daily gain or loss, lb. | 0.72 | 0.06 | —0.05 | 0.10 | 0.12 | 0.002 | —0.02 | 0.14 | 0.02 |
| Ave. daily feed consumption, lb. | 1.52 | 0.67 | 0.48 | 0.78 | 0.77 | 0.71 | 0.52 | 0.68 | 0.67 |
| Lb. of feed/lb. gain | 2.11 | 11.31 | † | 8.20 | 6.48 | 44.68 | † | 4.88 | 31.38 |
| Hb.-av. throughout entire period pigs were on trial‡ | 10.64 | 11.07 | | 11.63 | | 11.41 | | 10.57 | |

*Biotin fed at 20 μg./100 Gm. of feed.
**These pigs died at the stated number of days on trial.
†No figure given since the pigs lost weight.
‡Pigs No. 3, 4, 5, and 7 developed a slight normocytic anemia during their last three weeks on trial.

did the red blood cell count, and there developed a slight normocytic anemia. This is similar to the findings of Wintrobe, *et al.*[3] The anemia may have been due to a lack of protein intake since feed intake was very low with the pantothenic acid deficient pigs.

The inclusion of biotin in the ration of the pantothenic acid deficient pigs hastened the appearance of the pantothenic acid deficiency symptoms. Vomiting, diarrhea, and loss of appetite began to appear after two weeks on the experiment, while the deficiency symptoms in the pantothenic acid deficient pigs not receiving biotin did not appear for nearly a month after the experiment was underway.

The deficiency symptoms observed throughout this experiment were similar to those reported by Hughes[2] and Wintrobe, *et al.*[3] They included goose stepping to a slight degree, and it was observed that pigs standing would often exhibit a rhythmic kicking with one hind leg and then with the other. The skin became dry and flaky and the coat was rough, although there was no hair loss. There was a slight brownish exudate on the skin of the ears and neck. This is shown in figure 1. The thin and emaciated condition of the pantothenic acid deficient pig can also be noted in this figure. The feces were often watery and contained mucus. In some instances, blood was observed.

Table 2 contains a summary of the necropsy findings with the pigs on experiment. Seven of the 8 pigs fed a pantothenic acid deficient ration showed varying degrees of an enteritis. This finding is of considerable interest since it demonstrates that an enteritis may be obtained when a pantothenic acid deficient ration is fed. In addition, the enteritis was obtained with pigs kept under very clean conditions (on raised floors washed twice daily).

It is not necessarily suggested that the enteritis encountered was the well-known infectious necrotic enteritis entity. Only 2 pigs (1 and 8) showed the typical extensive, thick, dry, grayish, adherent exudate. The 5 remaining affected pigs showed only small lesions with variable redness and a shallow, yellowish gray, pasty, easily removed exudate. Ulceration under the exudate was not very apparent. Most of the focal lesions were in the cecum and colon near the ileocecal valve.

## SUMMARY AND CONCLUSIONS

Young pigs fed a diet deficient in pantothenic acid developed subnormal appetites, grew slowly, became thin and emaciated, showed a lack of normal coördination and goose stepped. Their skin became dry and

TABLE 2—Gross Lesions Found in 11 Pigs Presented for Necropsy

| Type ration | Basal | Basal minus pantothenic acid | | | | Basal minus pantothenic acid plus biotin | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | No acid given | | Small amt. acid given | | No acid given | | Small amt. acid given | |
| Lot No. | 1 | 2A | | 2B | | 3A | | 3B | |
| No. pigs | 8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Pig No. | 10, 11, 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | All 3 S* | D | D | S* | S* | S* | D | D | D |
| Necropsy findings | .... | + | + | + | — | —+ | —+ | —+ | + |
| | | E | F | G | H | I | J | K | L |

S = sacrificed; * = Pigs sacrificed at end of 126-day experimental period; D = died; + = enteritis; — = no enteritis; —+ = slight enteritis.

E = Severe necrotic colitis and cecitis. F = Necrosis in esophageal diverticulum. Colitis—lesions shallow, blood in exudate. G = Colitis and cetitis lesions shallow. H = Small gastric ulcer (3 x 5 mm.); slight excess of yellowish, clear peritoneal fluid. Some lobules in anteroventral parts of lungs show consolidation. I = Several yellowish white caseous foci (up to 7 mm. in wall of colon. Cecum and first few centimeters of colon show thickened and slightly rough wall with yellowish gray, pasty, readily removed exudate. (Histopathology of colon section—very heavy leucocytic infiltration of mucosa and submucosa—chiefly mononuclears; loss of much of surface epithelium; four granulating ulcers extending to or into submucosa; thrombosis of vein in submucosa adjacent to one ulcer; some accumulation of yellowish brown pigment granules in macrophages of lamina propria under denuded areas of mucosa.) J = Hyperemia of gastric fundus mucosa. Small patches of exudate in cecum and colon. Some blood and fibrin in colon contents. Mucus in bronchi, with small areas of atelectasis in right cardiac lobe of lung. K = Hyperemia and small hemorrhages in gastric mucosa. Slight catarrhal enteritis in small intestine. Extensive hyperemia, some hemorrhages, and few small foci of necrosis in colon. L = Severe necrotic enteritis and slight pneumonia.

flaky and the coat became rough in appearance. However, no hair loss was observed. The deficiency was further characterized by the development of a moderate normocytic anemia.

The inclusion of biotin in the ration of a pantothenic acid deficient pig was effective in prolonging the life of the pig, but caused the pantothenic acid deficiency symptoms to appear in half the time. This may be due to some interrelationship of biotin and pantothenic acid.

The immediate cause of death in the pantothenic acid deficient pigs was not clear, but the only significant gross lesions were those of an enteritis. It is suggested that possibly this disease was a secondary infection that followed after the symptoms of a deficiency of pantothenic acid developed in the pig.

**References**

[1]Hughes, E. H.: The vitamin B-complex as Related to Growth and Metabolism in the Pig. Hilgardia, *11*, (1938): 595.

[2]Hughes, E. H.: Pantothenic Acid in the Nutrition of the Pig. J. Agric. Res., *64*, (1942): 185.

[3]Wintrobe, M. M., Follis, R. H., Jr., Alcayaga, R., Paulson, M., and Humphreys, S.: Pantothenic Acid Deficiency in Swine. Bull. Johns Hopkins Hospital, *73*, (1943): 313.

[4]Wintrobe, M. M., Miller, M. H., Follis, R. H., Stein, H. J., Muskatt, C., and Humphreys, S.: Sensory Neuron Degeneration in Pigs. IV. Protection Afforded by Calcium Pantothenate and Pyridoxine. J. Nutr., *24*, (1942): 345.

[5]Hughes, E. H., and Ittner, N. R.: The Minimum Requirement of Pantothenic Acid for the Growing Pig. J. Anim. Sci., *1*, (1942): 116.

[6]Follis, R. H., and Wintrobe, M. M.: A Comparison of the Effects of Pyridoxine and Pantothenic Acid Deficiencies on the Nervous Tissue of Swine. J. Exptl. Med., *81*, (1945): 539.

[7]Emerson, G. A., and Wurtz, E.: Biotin-pantothenic Acid Interrelationship in Rats Fed Succinylsulfathiazole. Proc. Exptl. Biol. and Med., *57*, (1944): 47.

[8]Cunha, T. J., Lindley, D. C., and Ensminger, M. E.: Biotin Deficiency Syndrome in Pigs Fed Desiccated Egg White. J. Anim. Sci., *5*, (1946): 219.

[9]Lindley, D. C., and Cunha, T. J.: Nutritional Significance of Inositol and Biotin for the Pig. J. Nutr., *32*, (1946): 47.

[10]Kinsley, A. T.: Infectious Necrotic Enteritis. Vet. Med., *27*, (1934): 27.

[11]McEwin, A. D.: Necrotic Enteritis of Young Pigs not Associated with Salmonella Infection. Vet. Rec., *49*, (1937): 1507.

[12]Birch, T. W., Chick, H., and Martin, C. J.: Experiments with Pigs on a Pellagra-producing Diet. Biochem. J., *21*, (1927): 2065.

[13]Madison, L. C., Miller, R. C., and Keith, T. B.: Nicotinic Acid in Swine Nutrition. Science, *89*, (1938): 490.

[14]Davis, G. K., Freeman, V. A., and Madsen, L. L.: The Relation of Nutrition to the Development of Necrotic Enteritis in Swine. Mich. Agric. Exper. Sta. Tech. Bull., *170*, 1940.

[15]Rasmussen, R. A., Stafseth, H. J., Freeman, V. A., and Miller, Marion J.: Influence of B-vitamins, Liver, and Yeast on Induced Necrotic Enteritis in Swine. Vet. Med., *39*, (1944): 11.

[16]Mitchell, H. H., and Beadles, J. R.: The Paired-feeding Method in Nutrition Experiments and Its Application to the Problem of Cystine Deficiencies in Food Proteins. J. Nutr., *2*, (1930): 225.

[17]Heinemann, W. W., Ensminger, M. E., Cunha, T. J., and McCulloch, E. C.: The Relation of the Amount of Thiamin in the Ration of the Hog to the Thiamin and Riboflavin Content of the Tissue. J. Nutr., *31*, (1946): 107.

[18]Edgington, B. H., Robison, W. L., Burroughs, W., and Bethke, R. M.: Tests with Nicotinic Acid for the Prevention of Infectious Swine Enteritis. J. A. V. M. A., *101*, (1942): 103.

## Notes from the Eighth World's Poultry Congress

The vitamin A requirement of poultry was one of the major topics discussed at the Eighth World's Poultry Congress in Copenhagen in August. American reporters contended that carotene of plant origin was superior to vitamin A esters from fish oils.

• • •

Young alfalfa ground quickly before drying, instead of after drying, steps up the digestibility of its fat, fiber, and protein, according to studies made by Thoman in Switzerland and reported by him to the Congress.

• • •

Exploring the vitamin A requirement of laying hens, the Agricultural Research Laboratory of Copenhagen concluded that 400 units per day was the minimum need for Leghorn pullets.

• • •

That the quantity of fiber in the ration of domestic fowl may safely go as high as 5.5 to 8 per cent was the contention of Nils Olson of Sweden, whereas, the American idea is that 3 to 4 per cent should be the maximum percentage.

• • •

*Manganese for Cannibalism.*—Dr. K. E. Kull, Swedish veterinarian, told the Congress that manganese and horn meal is a cure for cannibalism and feather eating in chicks. Manganese sulfate in the mash, at the rate of 0.029 Gm. per bird daily, was the dosage recommended.

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*Meet Vitamin U.*—Vitamin U, or anti-ulcer factor, yet to be identified, found in alfalfa, kale, lettuce, and cabbage by the School of Medicine, Stanford University, inhibits the development of experimentally induced peptic ulcer in guinea pigs. Response of ulcer of the stomach in man remains to be demonstrated.—*From Science Digest.*

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Neither soybean oil meal nor sunflower seed oil meal allows maximum growth of chicks when fed as the only supplementary protein in a practical type of ration. (*Poult. Sci.*, July, 1948). Soybean oil meal apparently fails to provide enough methionine, while the sunflower seed product seems to lack lysine.

# EDITORIAL

## License to Practice — Privilege and Duty

The granting of a license to practice veterinary medicine imposes certain obligations upon the recipient at the same time and in the same manner as it grants certain privileges. The growth and development of the profession will be in direct proportion to the acceptance of the privileges and the discharge of the obligations.

A license, according to Webster, is formal permission from the proper authorities to perform acts or to carry on a certain business which, without such permission, would be illegal.

A license to practice veterinary medicine is a formal permission from a properly constituted state authority (licensing board) to treat the diseases and ailments of domestic animals, including furbearing animals, menagerie and zoo animals, etc.

### The Purpose

The board has been charged with the responsibility of using the most efficient and practical means for the prevention, suppression, control, and eradication of communicable diseases among domestic animals, including those which may be transmissible to man. A notable point in this connection is that the licensing board is charged with protecting the community, not the group of individuals who own the animals nor the group who treat the diseases and ailments of privately owned animals.

Licensing laws have been enacted to safeguard the food supplies and resources of the communities. They were enacted because legislators have recognized that indiscriminate and promiscuous practice of veterinary medicine is not the most efficient and practical means for preventing, suppressing, controlling, and eradicating animal diseases.

### The Method

First of all, the board requires that the applicant for a license must possess certain qualifications of education, training, and general knowledge. This is covered by a provision that the applicant must be a graduate of a school of veterinary medicine of a recognized degree of excellence. Next, the board requires that the applicant appear before its members and submit to an examination. On the manner in which this examination proceeds, the board determines the qualifications for practice within that state and renders its decision accordingly.

### The Privilege

Now, the license to practice is issued. It grants the privilege of treating the diseases and ailments of animals, it permits the use of the name "doctor" and of the veterinary degree, and it permits the licensed individual to make charges for his services.

### The Obligation

At the same time, the board reserves the right to suspend or revoke a license for failure to meet certain obligations expressed and implied in the granting of the license. For example, many states indicate that they need and anticipate the coöperation of the licensed veterinarians. This means that they expect licensed veterinarians to assist in those projects which are deemed to be the most efficient and practical means for preventing, suppressing, controlling, and eradicating animal diseases.

Such assistance varies from state to state, but in general it means participation in the organized programs for disease control and eradication—tuberculosis, brucellosis, etc. It also means the integration of preventive medicine in daily clinical practice. In many states it means the promotion of public health services in the community—participation in the work of the board of health, in the proper safeguarding of the milk and meat supplied to the community, and in protecting the residents

against diseases which might be communicated to them by animals or by animal food products. The article in this issue of the JOURNAL by Dr. K. F. Meyer discusses these obligations effectively and specifically.

THE ACHIEVEMENT

No practitioner can fully discharge his obligations to his community by working alone. It is necessary that there be coöperation not only between the veterinarian, the physician, and the livestock owner, but also between all of these and the state licensing authorities and regulatory officials, and cooperation between practitioners in the adjacent communities, and between veterinarians everywhere. The latter step demands regular attendance at meetings, local, state, regional, and national. It demands open discussion of the common problems, followed by a pooling of opinions from various observers, a fair and careful evaluation of the opinions expressed and the evidence submitted, and, finally, adoption by all veterinarians of the broad principles of the least expensive but efficient and practical means of fighting animal diseases.

All of these duties or obligations are inherent in the granting of a license to practice veterinary medicine, and they are just as important to the licensing agency and to the community as are the privileges granted along with the license. When the obligations, implied and expressed, lose their importance, it is a foregone conclusion that the privileges will fall to an equally low position.

## Pasteurization of Milk

Despite years of large-scale experience and the searching investigational work of America's best minds, vigorous opposition to pasteurization continues to flare up. The latest was a series of three articles published in *The Rural New Yorker*, which were reprinted and widely broadcast by the Pennsylvania Raw Milk Producer-Distributors (*J.Am.M.A.*, Sept. 11, 1938). The merits of pasteurization are too well known in the veterinary circle to waste words on details here. There is but to remember that 75 per cent of the milk sold in towns of over 1,000 population is now pasteurized, that the heating process takes little if anything from the nutritive value or the flavor of milk. All arguments to the contrary have long been refuted as unsound. "The opponents of pasteurized milk have failed to make a case against it in favor of the raw product" (McCollum, *Am.J.Pub.Health*, Sept., 1934).

An alarm for the veterinary service to ponder in the face of the new knowledge on the source of undulant fever is the strength against pasteurization that organized groups are still able to muster. It is estimated by the U.S. Public Health Service that upward of 2,500 cases of undulant fever in 1945 were traced to the domestic use of raw milk.

Moreover, it has become evident from a close contact with dairy farmers, public health officials, milk distributors, and consumers, that pasteurization has increased the popularity of milk and milk products on the diurnal dietary, so much so, indeed, that 27,000,000 dairy cows are scarcely sufficient to supply the demand, contrary to former times when "surplus milk" was the bane of the milk-producers.—L. A. M.

Objection is seldom raised to pasteurization, as an adjunct to the production under sanitary conditions of clean milk from healthy cows. Objection to universal or compulsory pasteurization is based on the assumption that it will encourage slipshod methods of production because "pasteurization will make it safe." Unfortunately, some advocates of compulsory pasteurization have said, or broadly inferred, that healthy cows and sanitary production methods could be minimized or forgotten in the face of universal pasteurization. On that basis, it would be a step backward, and a big one. Unless pasteurization is recommended and practiced as one additional aid to, and with no hint of a substitute for, healthy cows and sanitary methods, there is danger in universal and compulsory pasteurization.—R.C.K.

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In 1877, the Society for the Prevention of Cruelty to Animals of New York introduced a bill in the state legislature to provide for the licensing of veterinarians and the appointment of an examining board to certify to the qualifications of candidates for the licensure. A delegation of physicians and veterinarians protested (*Am. Vet. Rev.*, May, 1878, p. 75), and the bill was defeated.

# Dr. C. D. Van Houweling Joins Association Staff

The Board of Governors announces the appointment of C. Donald Van Houweling (D. V. M., ISC '42) as a staff member of the AVMA, effective Dec. 1, 1948. The appointment was made in order to maintain and develop professional relations, a phase

Dr. C. Donald Van Houweling

of AVMA activity which has been receiving more and more attention during recent years, and which bids fair to become increasingly important in the years ahead.

Dr. Van Houweling was born on a farm near Pella, Iowa, July 19, 1918. He graduated from Pella High School in 1935, took his pre-veterinary training at Central College, Pella, and was graduated from Iowa State College in 1942. Extracurricular activities at Ames included staff work on the yearbook, the *Bomb*, business manager of *The Veterinary Student*, president of his fraternity and of the all-campus Interfraternity Council, and his election, as one of 12 seniors of his class, to "Cardinal Key," the men's honorary fraternity.

After graduation, Dr. Van Houweling was associated in practice with Dr. A. E. Dickerson, Springfield, Ill., for eighteen months. He was married to Roberta Olson during that time, and they have two sons, Douglas and Donald, 5 and 2 years old, respectively. Called to active military duty, he was commissioned a first lieutenant in the Veterinary Corps, serving for more than three years. He acted in the capacity of "attending veterinarian" to quartermaster market centers in Columbus, Ga., and Kansas City, Kan. While in active service, Dr. Van Houweling attended the Medical Field Service School at Carlisle Barracks, Pa., and the Meat and Dairy Hygiene School in Chicago.

Dr. Van Houweling was selected by the Illinois Agricultural Association to serve as director of the newly created department of veterinary medical relations, and assumed the duties of this office upon his separation from the Veterinary Corps. In this capacity, it was his work to plan and develop a program to promote better livestock health among the herds and flocks owned by IAA members. The basic factor, and the one which has engaged most of his attention, is the establishment of a closer working relationship between livestock owners and their veterinarians. It required organizing, attending, and addressing agricultural and veterinary meetings; but the IAA directors had permitted him to stipulate that he was not to be considered a diagnostician or consultant in any individual or particular animal disease problem. This stipulation was rigidly followed, and the success of his efforts can be judged from the fact that the Illinois State Veterinary Medical Association selected him as its delegate to the San Francisco AVMA meeting, while the IAA helped to defray the expense of making the trip.

Dr. Van Houweling brings to his new position a thorough knowledge of veterinary problems, built upon a background of farm experience with animals, general practice, and a personal acquaintance with the problems which confront the veterinary profession in its progress toward the achievement of its ultimate goal—the rendering of a service which will insure a better standard of living for the human race. Progress in surgical and medical knowledge has outrun the general acceptance of this knowledge, and expanding horizons demand that professional relations be developed and cemented not only among veterinarians but also among the numerous groups interested in accomplishing the same end result, but approaching the problems from other angles.

## The Animal Health Trust

The Animal Health Trust (A.H.T.) in Great Britain* was organized in 1942 for a triple purpose: (a) to mobilize the enthusiasm and efforts of all who care for animal health; (b) to relieve animal suffering by promoting good health and assisting with the control of disease; and (c) to remedy the shortage of trained personnel and to encourage the development of research, laboratory diagnosis, hospital, and specialist services coöperating with veterinary practitioners for the benefit of all animals.

The A.H.T. is supported entirely by voluntary subscription and hopes to reduce the £50 million annual loss occasioned by animal diseases in Great Britain. It hopes also to relieve the unnecessary suffering of animals.

Attainment of these objectives is being sought in three directions: (a) research stations; (b) scholarships; and (c) animal hospital, diagnosis, and specialist service.

### Research Stations

The equine research station comprises residential facilities for personnel and stable and paddock facilities for animals. Infertility and parasitism are being studied as the first projects, with plans for study of the diseases of foals, of nutritional deficiencies, and of basic physiologic and pathologic problems.

The canine research station is in the formative stage. Estates have been purchased, and it is expected that research will begin within the coming year.

The livestock research station has made even less progress. Options on estates have been secured, and will be acquired and activated as promptly as possible.

### Scholarships

Since the beginning of the Trust, more than 60 scholarships, studentships, and research fellowships have been awarded at the veterinary colleges. These vary from £30 to £100 for studentships, and £100 to £200 for scholarships. The list of research titles is too long to enumerate, but it covers the full range of basic and graduate study and clinical medicine.

### Veterinary Clinical Services

Recent discussions among veterinarians indicate a difference of opinion regarding the desirability of establishing a hospital service. This difference centers around the needs of the urban animal and those of the farm animal. There is agreement, however, that an efficient hospital service must be accompanied by a laboratory diagnosis service and a provision for the training and registration of veterinary nurses and technical assistants. Training of this type will begin as soon as Parliament enacts a bill for the control of unauthorized veterinary practice. The training will be in full consultation with the Royal College of Veterinary Surgeons (RCVS).

*This report is based upon information submitted by Dr. J. Hickman, who calls attention to the similarity between A.H.T. and the research foundations in America. It is hoped that an exchange of research workers, both established workers and recent graduates, may be arranged between A.H.T. and the AVMA Research Council or some similar group. Primarily, however, this report is presented to provide a clear picture in the minds of our members and readers of the Animal Health Trust and its aims and objects, to the end that there may be closer coöperation between veterinarians separated by the Atlantic Ocean.—Ed.

## The USPHS

Founded by Congress as a function of the Treasury Department in 1798, the U. S. Public Health Service celebrated its 150th anniversary in July. The purpose was to provide a hospital service for the sailors of the Merchant Marine. It has had three names: the Marine Hospital Service (1798-1902), the U. S. Public Health and Marine Hospital Service (1902-1912), and the U. S. Public Health Service (1912—), each change representing expansion of its functions—from a hospital service for civilian sailors to the "Health Department of the U.S.A." In 1878, it took on seaport quarantine and research on the source and cause of contagious diseases, and in 1893, interstate quarantine. A modest bacteriologic laboratory set up in New York City in 1887, is now the famous Hygienic Laboratory on the outskirts of Washington.

These latter moments correspond to the time that the BAI was catching cattle ticks in the act of transmitting piroplasmosis. But what particularly concerns veterinary medicine is that the USPHS now has a "veterinary public health service" that is destined to participate in the control of animal diseases in a large way. It is now primed to tackle the rabies problem on a nation-wide basis, a service the BAI cannot undertake under existing laws.

# William J. Butler

## 1881-1948

Dr. W. J. Butler (NY-AMER '03), executive officer of the Montana Livestock Sanitary Board and state veterinary surgeon, died at his home in Helena on Oct. 27, 1948, after a lingering illness of several years. He was the successor of the late Dr. M. E. Knowles who, like Dr. Butler, was a towering figure in the livestock affairs of his state. Dr. Butler's opinions and decisions were the "last word" on the direction of the veterinary service of the range country. In the big problems of that field, after everyone had their say, Dr. Butler would rise and what he said decided the issue for the whole nation. In that rôle, his influence did not die with him but will live on. Moreover, his demise was not merely the loss of a great man in his declining years but of one who was able to convince the people of his state, regardless of political changes, that veterinary service is the sort of thing that should be planned and directed by men formally qualified to do so.

Under him, "the veterinary service of the future" was put to work—capable assistants, modern laboratories, and private practitioners strategically deployed.

He was appointed state veterinarian in 1913 and was instrumental in founding the Montana Livestock Sanitary Board, which placed the office of state veterinarian on a permanent basis. He was also responsible for the state-wide installation of meat, milk, and dairy inspection under the direction of the Livestock Sanitary Board, which he served for thirty-six years, the last twenty-seven as its chief executive officer.

In 1923, he served the U. S. Livestock Sanitary Association as president.

At the Cincinnati annual meeting of the AVMA in 1947, Dr. Butler was awarded the 12th International Veterinary Congress Prize and we quote from the citation at the time of the award:

> By work and administrative coöperation with all concerned within your state, with your neighbors, and with the federal government, you have not only mastered the animal plagues in Montana but, by example, you have inspired others to adopt your strategic plan of conducting a competent veterinary service in the public interest and to the best advantage of the veterinary profession, which is proud of you and your achievements.

Dr. W. J. Butler

A suitable biography of Dr. Butler, a duty of American veterinary historians, cannot be written faithfully in the space allotted to an obituary notice. Suffice to say here that he was a man of great mental and physical stature—friendly, jovial, serious-minded—whose words, always measured, carried a lot of punch. Born at Bowling, Scotland, May 18, 1881, he came to America at an early age. He married J. Ozella Cato in 1921. In 1925, he joined the AVMA, and was one of the most highly honored veterinarians of his time.

## Polio Virus

Research scientists of the Massachusetts Institute of Technology, at the (September, 1948) meeting of the Electron Microscope Society of America in Toronto, demonstrated the presence of moving dots inside of nervous tissue which were reportedly particles of poliomyelitis virus—to the lay press "An Exciting Discovery," to medical science, just a step forward in virus pathology.

# CURRENT LITERATURE

## ABSTRACTS

### Metatarsal Inclination in Cattle

The conformation of the limbs of dairy cattle is a matter of considerable economic importance, especially in the purebred cattle industry. The question of whether these deviations actually interfere materially with the efficiency of the dairy cow is highly debatable. From a study of 244 cows, varying in age from 2 to 16 years, it was concluded that this characteristic was highly heritable, and determined by multiple factor inheritance.—[*R. E. Habel: On the Inheritance of Metatarsal Inclination in Ayrshire Cattle. Am. J. Vet. Res., 9, (April, 1948): 131-139.*]

### Mammary Permeability of Sulfonamides

In this test, 18 Guernsey cows were subjected to intramammary injections of 8 sulfonamides: sulfanilamide, sulfamerazine, sulfathiazole, sulfapyrazine, sulfapyridine, sulfadiazine, 2-sulfanilamido-5-bromo pyrimidine, and 2-sulfanilamido-5-chloro pyrimidine. The results recorded in these experiments would tend to emphasize the probable significance of tissue permeability as a factor in the chemotherapeutic efficacy of a given drug.

On the basis of these results, it would appear that sulfapyridine, when fed, might be expected to give the best therapeutic effect of any of the eight drugs tested, if the infection involved the mammary gland of the cow and if the permeability of the infected gland was comparable to that of the normal gland.—[*V. T. Schuhardt, T. B. Carroll, L. J. Rode, and Helen Lacy: The Permeability of the Lactating Bovine Mammary Gland to Sulfonamides. Am. J. Vet. Res., 9, (April, 1948): 144-146.*]

### Sulfaquinoxaline in Coccidiosis

When sulfaquinoxaline was used as a prophylactic treatment at the rate of 0.05 per cent in the feed, preferably two days out of each five, it served as an effective means of preventing extensive losses of chickens from cecal and intestinal coccidiosis. No evidence of adverse effects on growth were observed, and there was no indication that laying birds would be disturbed in egg production or hatchability. Moreover, studies of the tissues failed to show microscopic lesions of toxicity.—[*L. C. Grumbles, J. P. Delaplane, and T. C. Higgins. Prophylactic and Therapeutic Use of Sulfaquinoxaline Against Coccidia of Chickens (Eimeria tenella and Eimeria necatrix) Under Field Conditions, Poultry Science, 27, (July, 1948): 411-419.*]

### Morphology of Bovine Spermatozoa

The most satisfactory method of making semen films is that in which a drop of diluted semen is spread over a clean slide by simply placing another clean slide face down on it and pulling the two apart lengthwise. No fixatives or clearing agents are used. Wet preparations of semen, under a coverslip, diluted with 3 per cent saline to kill the sperm have been used to a considerable extent and found particularly valuable.

Semen is best examined with the least manipulation, both for scientific study as well as routine insemination work. It should be done as soon after collection as possible and preferably before cooling. Faulty methods and techniques of handling semen are responsible for increasing the number of abnormal sperm. When simple methods of examination for sperm morphology are used, true abnormals are lower than generally reported. A clear understanding of what constitutes abnormal sperm is extremely important. Sperm should be considered abnormal when motility is affected, as this is the main essential for impregation; also when shape and structure digress from the normal so that motility is impaired. Curled tails, bent tails, and loose heads are all indications of abnormality, and the number and position of protoplasmic drops must be considered in evaluating the type of sperm available. Also, it must be remembered that faulty techniques in making semen preparations for examination have a serious bearing on the diagnosis.—[*C. K. Rao and G. H. Hart: Morphology of Bovine Spermatozoa. Am. J. Vet. Res., 9, (April, 1948): 117-124.*]

### Rabbit Plague and Cowpox

A spontaneous, acute disease produced a high mortality in a group of laboratory rabbits. It was caused by a virus which could be propagated on embryonating chicken eggs and by brain passage in mice, and could be transmitted experimentally in rabbits in numerous ways. In guinea pigs, it produced a local, pox-like blister, and reacting animals were immune to cowpox virus. Conversely, cowpox virus also immunized guinea pigs against the rabbit

plague virus. There seemed to be no relationship between rabbit plague virus and that of fowlpox, pigeonpox, canarypox, or turkeypox.—[*Immunity in Rabbit Plague, Immunological Relationship with Cowpox. By Jac. Jansen. Antonie van Leeuwenhoek, Journal of Microbiology and Serology, 11, (1946): 139-167.*]

## Listerellosis in Sheep

In the spring of 1944, circling became very pronounced in 1 animal in a feedlot of about 50 head of cattle. Cultural studies and animal inoculations were negative.

In April, 1945, this same feeder met with trouble in lambs, about three weeks after corn ensilage was supplied as part of their ration. The lambs were going off-feed, circling, and then dying wthin twenty-four to seventy-four hours. Within a week, 9 of the 240 lambs had died.

A culture was isolated, and because repeated testing on rabbits of a vaccine prepared from this culture still had virulent possibilities, no immunization attempts were made on lambs with it. Antiserum failed to protect against infection even when given simultaneously with the inoculant culture. Sodium sulfapyridine and penicillin gave the most promising results.—[*J. F. Ryff and A. M. Lee: Listerellosis—Report of an Outbreak in Wyoming Sheep and Preliminary, Experimental Therapy in Rabbits. Am. J. Vet. Res., 9, (April, 1948):147-151.*]

## Neurotropic Distemper in Foxes

Trembling in the hind limbs, weaving movements of the head, and convulsions were typical symptoms of an outbreak of neurotropic distemper on a Canadian fox ranch. The onset of the nervous manifestations was sudden, with champing of the jaws and drooling of a clear fluid usually being observed first. The symptoms became more pronounced as the hours passed. Holding the head up and back while turning or whirling was common. The tail was held up and forward, with the white tip close to the head, and in their whirling movements the animals gave the impression that they were trying to run away from the white tip. Exhaustion brought them to the ground, where they lay prostrate. When again able to stand, they walked unsteadily and clumsily. At rest, their breathing was slow, shallow, and nearly imperceptible, and they were not responsive to noises or other disturbances.

Though convulsions were typical of the onset of many cases, the only noticeable symptom in other cases was inappetence and a clear, watery discharge from the corner of the eye and sometimes from the nose. The temperature ranged from 103 to 107 F. In acute cases, death followed initial symptoms within thirty hours to fourteen days. Death resulted in every case marked by convulsions, although some of the animals withstood a number of seizures before succumbing. The severity of symptoms had no bearing on the length of time between onset and death; some animals showing only mild symptoms died faster than those badly affected. A few of the mild cases recovered.

The fact that discharges from the eyes and nose were clear and watery and did not cause encrustation of the eyelids was helpful in differentiating this form of distemper from that commonly seen in foxes, the latter form being characterized by a mucopurulent exudate.—[*A. H. Kennedy: Studies on Neurotropic Distemper of Foxes. Canad. J. Comp. Med. and Vet. Sci., 12, (June, 1948): 168-171.*]

## Streptomycin Sensitivity of Bacteria

In tests involving more than 200 strains of bacteria of various types, it was found that the *Bacillus anthracis, Brucella abortus, Brucella suis, Brucella melitensis, Pasteurella hemolytica, Pasteurella multocida, Corynebacterium renalis, Corynebacterium pyogenes, Staphylococcus aureus, Proteus ammoniae, Listerella monocytogenes,* and *Aerobacter aerogenes* are relatively sensitive to the action of streptomycin. The salmonellas, Streptococci, and some strains of Corynebacteria were found to be comparatively resistant to the action of streptomycin.

Strains of organisms vary widely in their susceptibility to this antibiotic, and the susceptibility of species is not confined to the gram-negative group of bacteria.—[*E. H. Coles, Jr.: The Sensitivity of Bacteria of Animal Origin to Streptomycin. Am. J. Vet. Res., 9, (April, 1948):152-156.*]

## Caronamide Inhibits Penicillin Excretion

The greatest limiting factor in the use of penicillin is its very rapid elimination from the blood stream. This is of the order of renal plasma flow, that is, the drug is completely removed from the plasma as it circulates through the kidneys. Clinical results substantiate the statement that the co-administration of p-aminohippurate (PAH) enhanced, substantially, the plasma concentration of penicillin by restricting its elimination. Because immense doses of this product were needed to maintain blood levels of penicillin, and because it was necessary to administer it by constant intravenous infusion, studies were continued to find a substitute drug. The substance known as caronamide or staticin has been found to have the beneficial effects of PAH without its drawbacks. The chemical name of this drug is 4'carboxyphenylmethanesulfonanilide.

An orally administered dose of caronamide

was capable of materially decreasing the renal clearance of penicillin as evidenced by its absolute value and the clearance ratio. Such dosage had no effect on the elimination of glucose, urea, amino acids, sulfonamides, or glomerular filtration. Neither did it alter systemic blood pressure, respiration, or renal volume even after continued administration.

It was concluded that caronamide administered orally or intravenously to a dog or mouse is capable of inhibiting the excretion of penicillin by the renal tubules. This inhibition is of such a nature that the dosage of penicillin necessary to cure experimental infection in the dog and the mouse was 3.7 to 11.0 times as great when penicillin was injected alone as when it was administered with an oral dose of caronamide. The advantage which accrues to the use of penicillin with caronamide is not due to a synergistic effect of the two agents but is attributable to the elevation and prolongation of the penicillin plasma concentration in the presence of caronamide.—[*K. H. Beyer: Renal Tubular Excretion of Penicillin as Inhibited by Caronamide. Am. J. Vet. Res., 9, (April, 1948): 157-163.*]

## A Survey of the Veterinary Literature from Portugal

(The following is a brief summary of some items appearing in Vol. I of Cadernos Cientificos.)

*Blood Hemolysate.*—In a discussion of the preparation of pertussis vaccine, J. A. M. De Loureiro and Ivone Rodrigues describe a method for obtaining blood hemolysate free from solid particles and which may be sterilized by filtration (45-64). It consists of hemolizing oxalated blood with distilled water and then adding a solution of sodium and calcium chlorides.

*Maximum Penicillin Production.*—The requirements for secretion of penicillin are listed by J. A. M. De Loureiro (65-85) as an adequate carbon supply and a moderately alkaline solution. Maximum penicillin production with a minimum of contaminating impurities is obtained when cultures are maintained at pH 8, if adequate energy is available.

*Intradural Lipoma in the Horse.*—This type of tumor is extremely rare, but the authors, Diogo Furtado and Vasconcellos Marques, report (127-159) a case which occurred at the level of the last medullary segment of the tail of the horse. The report is illustrated with photomicrographs and sketches.

*Arteriovenous Anastomoses.*—Three typical examples of direct connection between the arterial and the venous system are usually described as unrelated, distinct entities. However, the author, Jaime Celestino Da Costa, regards them as a well-defined, physiopathologic unit, and presents (165-200) the deductions upon which normal arteriovenous anastomoses, cirsoid aneurysms, and traumatic arteriovenous fistulas are classed as a series of steps in a short-circuiting of the collateral circulatory channels.

*Penicillin Excretion.*—Practically all of the penicillin injected into rabbits was recovered in the urine by Eugenio Lito (223-234). Elimination was more rapid when the agent was dissolved in distilled water, but even a beeswax-peanut oil suspension was eliminated so rapidly that 60 per cent of it was recovered in the urine within two hours.

*Catarrhal Inflammation.*—Catarrhal inflammations are initiated, says J. A. M. De Loureiro (324-394), by implantation into susceptible tissues of microörganisms possessing the property of aggressiveness. Spontaneous cure depends upon development of acquired immunity, there being little participation of general immunity. Treatment of chronic catarrhal inflammation may be based on three main principles: surgical intervention, chemotherapy, and/or parenteral use of specific antigens.

## Lumbar Block in Equine Colic

The treatment was found effective in colic caused by functional disturbance of the motor nerves of the alimentary tract, whether spastic or paralytic. It had no effect on mechanical obstruction, *e.g.*, strangulation, thrombo-embolic colic, enterolithiasis, but was of differential diagnostic value in these diseases.

A 0.25 per cent solution of novocain was injected into the adipose capsule of the kidney. The injection was unilateral, on the left side, between the last rib and the transverse process of the first lumbar vertebra. The point of injection was 5 to 6 cm. medial to the free end of the transverse process. The needle was inclined slightly craniomesad. The depth of injection was 8 to 13 cm., depending on the condition of the horse. The quantity injected was 300 to 450 cc. Lack of resistance indicated that the needle was in the peritoneal cavity; strong resistance, that it was in the renal parenchyma. Correct injection was verified by aspiration.

Lumbar block relieved colic symptoms in twenty minutes in 3 cases of acute gastric distention (regarded as pylorospasm), 1 case of catarrhal intestinal spasm, 1 case of stasis of the ileum, and 3 cases of tympanites. The treatment failed in 1 case of tympanites, when the horse died of respiratory distress. It was also ineffective in a case of coprostasis of the large colon.

Lumbar block was followed by the universally adopted treatments for fermentation and intoxication.—[*P. F. Terekhov, Military Veterinary Academy, U.S.S.R.: Lumbar Novocain Block in the Treatment of Colic of Horses. Veterinariya, 25, (March, 1948): 17-21.*]—R.E.H.

## BOOKS AND REPORTS

### Meat Inspection

This is a supplement to the January, 1947, edition of the regulations governing the meat inspection of the United States Department of Agriculture. The amendments and changes in the meat inspection regulations which have been made during the past year are listed in complete form.—[*June, 1948, Supplement to the January, 1947, Edition of the Regulations Governing the Meat Inspection of the United States Department of Agriculture. Printed at U. S. Government Printing Office. 9 pages. 1948.*]

### Sulfonamides in Veterinary Medicine

This book discusses the history, the chemical and physical properties, the mode of action, the absorption and excretion, and the toxicity as well as the pharmacodynamics and the clinical use of sulfanilamide, sulfathiazole, and sulfapyridine.

Under the various species of animals, it discusses the conditions for which the several drugs may be used to advantage. It tells the method of administration, the rate of dosage, and all other pertinent facts regarding the use of sulfonamides in the treatment of these diseases.

The book is a compilation of the recent information and the present status of the use of the sulfonamide drugs in veterinary medicine.—[*Pharmacological Activity and Clinical Use of Sulfanilamide, Sulfathiazole and Sulfapyridine in Veterinary Medicine. Paper. 48 pages, mimeo. Published by Merck & Co., Rahway, N. J. June, 1948.*]

### Scientific and Technical Societies

This handbook of scientific and technical societies and institutions of the United States and Canada has been prepared jointly by the National Research Council of the United States and the National Research Council of Canada. It is a directory of those societies, associations, and similar organizations in the natural sciences and related fields that contribute to the advancement of knowledge through their meetings, publications, and other resources.

Each organization is represented by name, address, name of president, and executive secretary. Then a brief review of the history of its standing committees, purposes, the number and type of membership, time of meetings, the size of the library, research funds, medals and other awards, and its publications. This volume lists 1,302 organizations in the United States and 166 in Canada.—[*Handbook of Scientific and Technical Societies and Institutions of the United States and Canada. 5th edition. Callie Hull, librarian and editor. Published by the National Research Council, National Academy of Sciences, Washington, D. C. Cloth. 371 pages. the Lord Baltimore Press, Baltimore, Md. 1948.*]

### Methods in Medical Research

This book, for the first time, lists exact descriptions of tested methods, procedures, apparatus, source references and evaluations used in medical research.

The book is divided into four sections as follows: (1) Assay of Antibiotics, (2) Circulation—Blood Flow Measurement, (3) Selected Methods in Gastroenterologic Research, and (4) Cellular Respiration. Because it discusses each of these questions intensively and accurately, the book should be of great value to veterinarians interested in anatomy, bacteriology, biochemistry, hematology, and pathology. For the most part, the reports are of such a nature that they are not readily applicable by practitioners because of the limited laboratory facilities which most of these veterinarians possess.—[*Methods in Medical Research, Vol. 1, V. R. Potter, editor-in-chief, Madison, Wis.; editors, Henry Welch, Washington, D. C., H. D. Green, Winston-Salem, N. Car., and A. C. Ivy, Chicago, Ill. Cloth. 372 pages. The Year Book Publishers, Inc., 304 S. Dearborn St., Chicago. 1948. Price $8.00.*]

### Canned Food

Commercially canned foods play a vital rôle in the nutrition of our civilian population. However, such foods became more important in the midst of military conflict, and particularly when the armed forces were distributed in all parts of the world. Many wartime developments in the canning industry can be reflected in quality improvement, in the standards of canned foods, as well as in other lines of nutrition. In order that the newest and the most pertinent facts concerning this class of foods may be made widely available, the Research Division of the American Can Company has compiled the available information under several headings such as: Can Manufacture and Canning Technology, Modern Knowledge of Nutrition, Dietary Inadequacies, Recommended Dietary Practices, The Nutritive Values of Commercially Canned Foods, Facts About Commercially Canned Foods and Their Containers, Public Health Aspects of Canned Foods, and Regulations and Laws Governing Processed or Packaged Foods.

Veterinarians interested in nutrition research and also veterinarians who practice in communities where food for canning is being raised extensively will be interested in this book.—[*The Canned Food Reference Manual. 3rd edition. R. W. Pilcher, editor-in-chief, and*

*16 members of a board of editors. Cloth. 638 pages, many illustrations. Printed by Rogers-Kellogg-Stillson, Inc., for the American Can Company, 230 Park Ave., New York 17, N. Y. 1948.*]

## Helminth and Arthropod Parasites

This is a service publication, and is a complete and accurate list of the helminth and arthropod parasites found in Australia. It deals chiefly with the parasites of domestic animals but includes also lists for certain wild animals. A division is made between those parasites which have become established, those reported but not established, and those that are doubtful.—[*Host Check List of Helminth and Arthropod Parasites Present in Domesticated Animals in Australia. By H. R. Seddon, 41 pages, paper. Division of Veterinary Science, Department of Health, Canberra, A. C. T., 1947.*]

## Proceedings of the Ohio Association

Proceedings of the sixty-fourth annual meeting of the Ohio State Veterinary Medical Association, along with a directory of the members of this association, a tabulation of its presidents, secretaries, and committees, and a listing of the BAI veterinarians active within the state, is reported. This yearbook of the meeting which was held on January 7-9, 1948, also presents, *in toto*, the papers read at this convention. — [*Proceedings of the Ohio State Veterinary Medical Association. Annual meeting, 1948. Compiled and edited by F. J. Kingma, Columbus, Ohio, secretary.*]

## Communicable Diseases in Australia

This book is a compilation or a review of the communicable diseases of animals in Australia. It lists 10 viral diseases, 7 protozoan diseases, 19 bacterial diseases, and 22 parasites, as well as 3 diseases of doubtful etiology. For each disease, it gives a brief discussion of the time of introduction, the prevalence within the continent, and the relative economic importance of this disease.

By far the most impressive point in the entire bulletin is the list of 28 diseases which do not occur in Australia, and the names which appear on that list. For example, there are such names as Aujeszky's disease, Borna disease, epizoötic lymphangitis, equine encephalomyelitis, equine infectious anemia, foot-and-mouth disease, fowl plague, glanders, hemorrhagic septicemia of cattle, lamb dysentery, rabies, rinderpest, swine fever or hog cholera, trypanosomiases, tularemia, and vesicular stomatitis, among others. Some of these are listed as having been present in Australia at some time in the past, but having been speedily eradicated.—[*A Review of Communicable Diseases of Animals in Australia. A service publication of the Division of Veterinary Hygiene. Prepared by H. R. Seddon, Canberra, A.C.T. Printed in Australia by L. F. Johnston, Commonwealth Government Printer, Canberra. Paper. 37 pages. 1948.*]

## Canine Encephalitis

Functional recovery does not occur in dogs when damage to the nervous system has been severe and complete. Such dogs are left with altered mentality, defective vision, deafness, or muscular incompetence.—[*A. B. MacIntyre, D. J. Trevan, and R. F. Montgomerie. Observations on Canine Encephalitis. Presented at the 66th Annual Congress of the National Veterinary Medical Association of Great Britain and Ireland, Sept. 8-15, 1948.*]

## Veterinary Clinical Parasitology

Based upon the general principle that the control of disease can be successful only when it is preceded by accurate diagnosis, this book has been carefully planned and designed to assist the practitioner in making a diagnosis of parasitism and of parasitic disease by means of laboratory techniques. The book is divided into three main chapters: (1) fecal examination in the diagnosis of parasitism, (2) skin examination for evidence of parasitic mites, and (3) the diagnosis of lice infestations.

Under each of these headings, there is a general discussion of the manner in which the particular parasites to be considered affect the animal, then there is a classification of the parasites, and, finally, a series of pictures which shows each of the parasites in microscopic detail just as they will be seen by the worker in making his examination in the field.

For the busy practitioner, this book should be a great help not only because it details step by step the procedure by which an accurate diagnosis may be made, but also because it helps to take the guess work out of parasitology by showing in detail the particular parasites which the diagnostician is likely to see in his preparation.—[*Veterinary Clinical Parasitology. By E. A. Benbrook and Margaret W. Sloss, Ames, Iowa. Cloth. 196 pages, 247 illustrations. Iowa State College Press, Ames, Iowa. 1948. Price $4.50.*]

## Periodic Ophthalmia

A bulletin in three parts, which discusses in logical order for the practicing veterinarian this important, if controversial, subject. Part I deals with the clinical examination and the basis for a diagnosis, part II with the statistical studies, and part III with the experimental investigation. The veterinarian whose clients

call upon him for diagnosis and treatment of periodic ophthalmia will want to read this bulletin and keep it handy for reference.—[*Periodic Ophthalmia of Horses and Mules. By W. W. Dimock, D. W. Bruner, and P. R. Edwards. Bull. 512, Kentucky Agric. Exper. Sta., University of Kentucky, Lexington. 35 pages.*]

## Veterinary Report of Southern Rhodesia

Foot-and-mouth disease and African coast fever provided the chief veterinary problems in Southern Rhodesia during the year 1947. The incidence and the distribution of some other diseases are listed, together with facts about economic loss occasioned by the presence of these diseases.—[*Report of the Chief Veterinary Surgeon of Southern Rhodesia for the year 1947. Prepared by P. D. Huston, Chief Veterinary Surgeon, and presented to the legislative assembly in 1948. Printed for the Government Stationery Office by the Rhodesian Printing and Publishing Company Ltd., Salisbury. 1948.*]

## International Journal of Comparative Physiology and Ecology

According to the foreword in Vol. I, No. 1, which was issued April 15, 1948, this journal will publish, quarterly, reports of original research in the fields of comparative physiology and ecology of the vertebrates and invertebrates.

Articles for publication may be submitted in English, French, or German, with a 300-word summary, and a second summary in English or French. Manuscripts may be submitted to any of the 16 members of the board of editors. J. H. Welsh, Cambridge, Mass., and C. A. G. Wiersma, Pasadena, Calif., are the American members of the board. Corrected proofs should go to Dr. E. J. Slijper, Bilstraat 172, Utrecht, The Netherlands.—[*Psysiologia Comparata et Oecologia, Uitgeverij Dr. W. Junk, Den Haag.*]

## Public Administration Organizations

The several agencies which are listed in the directory are divided into three main groups: (1) organizations of, or for, public officials and administrators, (2) professional and technical societies, and (3) citizen organizations.

The first 148 pages of the book list national organizations alphabetically. Under each organization there is either the president or the executive secretary, the names under which it was formerly known, membership, the secretariat, its activities, affiliations, and publications. This discussion is followed by national organizations classified by fields of activity, by state and regional organizations, and Canadian organizations. The state, regional, and Canadian organizations are identified by name, address, and the name and address of the active official.

The book has been compiled for the use of these organizations themselves, for public officials, and for students of government, as a guide to sources of information.—[*Public Administration Organizations. 6th edition. Laverne Burchfield, editor, Chicago, Ill. Public Administration Clearing House, 1313 E. 60th St., Chicago 37, Ill. 216 pages. 1948.*]

## The Crisis of Mankind

This book constitutes the proceedings of the conference held in connection with the inauguration, on April 25, 1946, of James Lewis Morrill as the eighth president of the University of Minnesota. The title chosen for this conference was "The Crisis of Mankind: The Urgent Educational Tasks of the University in Our Time." Although the conference did not solve this problem, it did produce a clarification because the more than 20 speakers who participated in the three-day program presented more than a forum of platitudes.—[*The Crisis of Mankind. 123 pages, illustrated, paper. University of Minnesota Press, Minneapolis, Minn. 1947.*]

## Soldiers' Rations

The Subsistence Research and Development Laboratory has carried on a continuous series of projects to determine the most suitable type of field rations for the armed forces. Volume 10 of their reports on these trials deals with general products, specifically the importance in the diet of such substances as beverages, confections, desserts, flavorings, spices, condiments, relishes, jams, jellies, and nuts.

While not primarily veterinary problems, the value of these items is of interest particularly to those veterinarians who are now or may be engaged in food inspection for the armed forces.

Volume 7 of this series deals with dairy products, vol. 8 with fats, fish, and poultry products, and vol. 11 with meat products.—[*A Report of Wartime Problems in Subsistence Research and Development. Edited by Capt. H. A. Conway, and Alice I. Meyer. 90 pages, paper. Quartermaster Food and Container Institute for the Armed Forces. Chicago 9, Ill.*]

*Tourist Leaflet on Foot-and-Mouth Disease.*—A leaflet giving pertinent facts about the prevalence, infectivity, and control of foot-and-mouth disease has been issued by the U.S. BAI, for the guidance of visitors to Mexico. Its appeal is for the coöperation of travelers in helping to keep the plague out of the U. S. A.—[*Help Protect the United States from Foot-and-Mouth Disease. Bureau of Animal Industry, USDA, Washington, D. C., May, 1948. Public document.*]

# THE NEWS

## The AVMA European Tour to the 14th International Veterinary Congress

The 14th International Veterinary Congress will be held in London, England, Aug. 9-14, 1949. A European tour is being planned for the benefit of those AVMA members who expect to attend this Congress.

Although plans for the tour are still in a very indefinite stage, they do provide for visits to France, Switzerland, Belgium, Holland, England, Scotland, Denmark, Sweden, and Norway. It is hoped that the usual points of interest will be supplemented by visits to at least one veterinary college in each country visited.

The tentative schedule calls for leaving Detroit directly from the AVMA convention July 11-14, 1949, sailing from New York July 15 to Cherbourg, thence to Paris, Zurich, Lucerne, Interlaken, Berne, Brussels, Amsterdam, London, Edinburgh, Copenhagen, Stockholm, and Bergen. The homeward trip will start on September 1 and the tour will end in New York on September 8.

### Reservations Limited

Transatlantic boats have been unable to carry all passengers requesting space during the past two seasons, and already have a waiting list for the 1949 season. However, a tentative allotment of space has been requested for the AVMA tour. Because it may not be possible to provide space for all who request it, reservations will be made in the order in which they are received, and space will be provided as far down the list as accommodations are available.

### File Reservations at Once

Reservations are being accepted immediately. Dr. D. M. Campbell, 7632 South Crandon Ave., Chicago 49, Ill., is in charge of the tour and the application for reservation should be sent to him, accompanied by a deposit of $450.00 for each passenger, because the steamship company will require a deposit equal to the one-way fare by Jan. 1, 1949. In case a reservation must be cancelled, the complete deposit will be returned if cancellation is made before June 15.

The cost of the complete trip is not yet established but is tentatively set at $1,500 per passenger, with the probability that it will be less than that figure.

Space is sure to be at a premium; therefore, reservations can be accepted only with the understanding that they will be placed on file and that space will be allotted if accommodations are made available.

### Tentative Itinerary for AVMA European Tour to 14th International Veterinary Congress

July

15 Sail from New York.
20 Due Cherbourg. Rail to Paris.
21 In Paris. Full day sightseeing by motorcoach with guide.
22 Afternoon excursion to Veterinary College at Alfort. Evening special tour of the night clubs.
23 Full day excursion by motorcoach with guide to Versailles and Malmaison.
24 In Paris. Free day for independent action.

Enter Switzerland

25 Leave Paris by morning train to Lucerne, Switzerland.
26 Full day excursion to Zurich. Lake steamer excursion to Rapperswil.
27 In Lucerne. Morning sightseeing on foot with guide. Afternoon over the Brünig Pass by motorcoach to Interlaken.
28 Full day excursion by coach over the high passes of Switzerland: the Furka Pass, the Rhone Glacier, the Grimsel Pass, and return *via* the new road over the Susten Pass.
29 Morning train to Berne. Visit Veterinary College in afternoon.

To France and Luxembourg

30 By rail through Basel and Strasbourg, France, to Luxembourg.

(*Continued on next page*)

***If You Plan to Take the Tour, send your reservation immediately to:***

**Dr. D. M Campbell**

**7632 South Crandon Ave.,**

**Chicago 49, Ill.**

**Enclose check for $450 for each reservation. Cancellations accepted up to June 15, 1949, with refund of deposit.**

ENTER BELGIUM

31 By motorcoach to the "Bulge" battlefield area and continue to Brussels for the night.

August

1 Morning sightseeing in Brussels by motorcoach with guide. Afternoon visit Veterinary College.

FROM BELGIUM TO HOLLAND

2 By rail from Brussels to Amsterdam.
3 In Amsterdam. Morning city sightseeing by motorcoach with guide. Afternoon excursion to Volendam and the Isle of Marken.

FROM HOLLAND TO GREAT BRITAIN

4 Morning train to The Hague. Morning sightseeing by motorcoach with guide in The Hague and Scheveningen Beach. Afternoon free in The Hague. By motorcoach to the Hook of Holland and night steamer to Harwich and London.
5 Arriving London in the morning. Afternoon train to Edinburgh.
6 In Edinburgh. Morning city sightseeing by motorcoach with guide. Afternoon visit Veterinary College.
7 Excursion by motorcoach to the Sir Walter Scott country.
8 By rail from Edinburgh to London.
9-14 In London attending 14th International Veterinary Congress.
15 London. Full day excursion by motorcoach to Shakespeare country, Kenilworth, Stratford-on-Avon, Shottery (Anne Hathaway's Cottage).
16 In London. Full day excursion by motorcoach to Stoke Poges, Windsor Castle, Hampton Court Palace.

FROM GREAT BRITAIN TO SCANDINAVIAN COUNTRIES

17 In London. Afternoon train to Harwich. Steamer to Gothenburg.
18 Enroute.
19 Arrive Gothenburg, Sweden. Short sightseeing of the city by motorcoach with guide, and proceed by rail to Copenhagen.
20 In Copenhagen. Morning city sightseeing by motorcoach with guide. Afternoon visit Veterinary College.
21 In Copenhagen. Full day excursion to the Danish Riviera visiting Elsinore and Kronborg castle, returning *via* Hilleröd and Frederiksborg castle.
22 By rail from Copenhagen to Stockholm.
23 In Stockholm. Morning city sightseeing by motorcoach with guide. Afternoon free for independent action.
24 In Stockholm. Morning visit Veterinary College. Afternoon excursion by motor launch "Under the Bridges."
25 By rail from Copenhagen to Oslo.
26 In Oslo. Morning city sightseeing by motorcoach with guide. Afternoon visit Veterinary College.
27 Early departure by rail to Myrdal and by electric cogwheel railroad to Flam.
28 In the fjord district, visiting the Sogne
29 Fjord, Balestrand, Kvikne, Gudvangen, Stalheim, Voss, and Bergen.
30 In Bergen. Free for independent action.

BACK TO ENGLAND

31 By plane to London and continue by rail to Liverpool.

September

1 Transfer to the boat and sail.
8 End of the tour at New York.

## Executive Board Election In District IX

Nominating ballots for members of the executive board from district IX (Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont) have been counted by the board of tellers consisting of Drs. W. A. Young and R. L. Trader. The nominees certified by the tellers are: Drs. L. A. Corwin, M. G. Fincher, G. H. Hopson, B. S. Killian, and Edwin Laitinen. An election ballot has been mailed to each AVMA member in the district. The polls for this election will close Jan. 15, 1949, and the victor will fill the unexpired term ending in 1952. The vacancy was created when the incumbent, Dr. C. P. Zepp, Sr., became president-elect of the AVMA at San Francisco in August.

## United States Livestock Sanitary Association

The fifty-second annual meeting of the USLSA was held at Denver, October 13-15, 1948 under the presidency of Jean V. Knapp, chief livestock sanitary officer and state veterinarian of Florida. The attendance was smaller than that of the meetings held in Chicago but without any noticeable gap in titulary delegates. The address of welcome by Governor Lee Knous was responded to by State Veterinarian R. W. Smith of New Hampshire.

Columbus, Ohio, was selected for the meeting of 1949, obviously in keeping with the trend to scatter the Association's influence more widely.

The program conformed to the usual pattern —the discussion of outstanding problems by outstanding men. Among the titles of 1948 were community auctions, tuberculosis, brucellosis, infectious anemia, anaplasmosis, foot-and-mouth disease, distomiasis, rabies, swine erysipelas, avian pneumoencephalitis, and pullorum disease.

State Veterinarian T. O. Brandenburg, of North Dakota, was elected president and State Veterinarian R. A. Hendershott of New Jersey was reëlected secretary-treasurer.

For details of the annual meetings of this important national organization, one must wait for the publication of its annual report which, under the successive secretaries of recent years, has become a true mapping of the veterinary service of the U. S. A.

## Resolution on Animal Experimentation

The following resolution on animal experimentation was unanimously passed by the Executive Committee of the American Association

for the Advancement of Science at the centennial meeting in Washington, D. C., Sept. 15, 1948.

At this Centennial Meeting the American Association for the Advancement of Science reaffirms its conviction that animal experimentation is essential for progress in the biological and medical sciences.

We recognize the important rôle of animal experimentation in the study of and the control of diseases, especially those of childhood, and in the perfecting of those procedures and treatments to which no small part of our community owes its health and life.

We regard with apprehension the activities of certain groups which are attempting to prevent the use of unclaimed animals for study in qualified institutions of biology and medicine.

This association is in accord with the practically unanimous and often expressed authoritative voice of science and medicine that animal experimentation has conferred and is conferring inestimable benefits upon mankind, as well as upon animals themselves.

The American Association for the Advancement of Science, with a membership of over 40,000 and representing all the sciences of nature and of man, is confident that a fully informed public will not support legislation which would seriously interfere with the progress of preventive and curative medicine.

The Association believes that a supply of animals for research and teaching purposes for qualified institutions should be assured, by legislation or ordinance where necessary, and not left to the option of local pound officials and private groups.

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## Veterinary Public Relations of the AFAH

Next year's 8-point public relations program of the American Foundation for Animal Health will comprise (1) news releases to nearly 3,000 newspapers; (2) releases to state and national farm publications; (3) illustrated articles and cartoons to 2,600 weekly and rural papers; (4) radio news service to 400 radio stations; (5) educational messages on "What the Veterinary Profession Means to Mankind" in 13 leading farm magazines; (6) special hog cholera warnings in 15 farm journals (7) a radio campaign, urging cholera vaccination, over 19 radio stations; and (8) motion picture "Valiant Years" to be shown throughout 1949 to the general public.

The education of the public on veterinary matters will have several different objectives. One will seek to make animal owners more conscious of disease hazards. Another will show animal owners the importance of correct veterinary diagnosis and treatment and the dollar-and-cents value of relying on the veterinarian for such treatment. Still another phase of the campaign will warn owners of the danger of self-medication and "drug store" diagnosis. A fourth part of the effort will concentrate on the general public, to make everyone more conscious of the importance of veterinary science to the national welfare, and the great service the veterinarian renders in his own community and to the nation as a whole.

Members of Associated Serum Producers who have contributed the funds for support of the effort are: Allied Laboratories, Inc.; Blue Cross Serum Co.; Corn Belt Laboratories, Inc.; Fort Dodge Laboratories, Inc.; Grain Belt Supply Co.; Jensen-Salsbery Laboratories, Inc.; Liberty Laboratories; Missouri Valley Serum Co.; Norden Laboratories; Pitman-Moore Co.; Sioux City Serum Co.; Sioux Falls Serum Co.; The Columbus Serum Co.; The Corn States Serum Co.; The Gregory Laboratory; The National Laboratories Corp.; The Royal Serum Co.; The Southwestern Serum Co.; The United Serum Co.

"We have already had convincing evidence that the campaigns carried on in the past few years are beginning to bear fruit . . . and that the public is showing an increasing appreciation of the veterinary profession, and is making ever-greater use of the veterinarian's services," one of the spokesmen for American Foundation for Animal Health reports. "But public education is a long-range job. It cannot be done overnight. It takes years and years to shape an entire nation's thinking habits. That is why we are continuing our program unabated."

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## AVMA Research Fellows

This is the fifth in the series of discussions (*see* JOURNAL, July:47; Aug.:187; Sept.:291; Oct.:371) of the fellowships operating under the supervision of the Research Council of the AVMA, and a listing, in turn, of the fellows who either have completed their work or are receiving support from the Research Fund.

Following is a resumé of the background of Dr. J. H. Drudge and the work in which he is engaged at The Johns Hopkins University as a research fellow.

J. H. Drudge, born Feb. 7, 1922; D.V.M. (1943) Michigan State College, Veterinary Corps, U. S. Army 1943 to 1946; AVMA research fellow at The Johns Hopkins University (Sept. 1, 1947 ...).

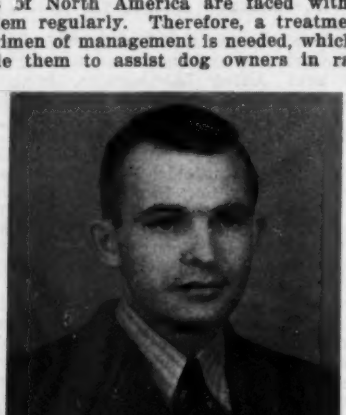
### SUMMARY OF WORK TO DATE

The research problem centers around a study of the chemotherapy of canine filariasis. During the first year of the study, course work required for the degree was absolved, background reading was completed, and the problem was begun with a familiarization with the techniques used in studies of this type.

The general plan of the problem is to begin with *in vitro* screening of some additional phenyl arsenoxides for microfilariacidal activity, then study certain pharmacologic aspects concerned with the oral administration of this group of drugs in dogs and, finally, to study the clinical use of the phenyl arsenoxides in the therapy of canine filariasis.

The purpose of the project is to find or develop a more effective and a practical means of handling this type of paracitism in every-

day veterinary practice. Practitioners in many parts of North America are faced with this problem regularly. Therefore, a treatment or a regimen of management is needed, which will enable them to assist dog owners in raising



Dr. J. H. Drudge

animals free from the parasite and to rid them of the infective agent when they have already become established in the blood stream.

The project is still in its first stage, namely, the screening of additional phenyl arsenoxides in a search for one or for a combination which will produce the desired result without unfavorable effect upon the host animal.

## The World Health Assembly

The World Health Assembly, with delegates from 68 nations, met on June 24 to July 24, 1948, in Geneva, Switzerland, to forge the permanent structure of the World Health Organization.

In spite of varying regional health problems and different national methods of approach, programs and subjects covering more than 50 health activities were considered for 1949 and priorities were assigned as follows: (1) global campaigns against malaria, tuberculosis, and venereal infections and promotion of maternal and child welfare, better nutrition, and environmental hygiene; (2) public health administration; (3) parasitic diseases; (4) virus diseases; (5) mental health; and (6) cancer, rheumatoid diseases, and leprosy. Work is also being planned in international epidemiology and quarantine, international health statistics and nomenclature, fellowships, medical literature, emergency services, and reference services and libraries.

Dr. Brock Chisholm, of Canada, internationally known psychiatrist, was elected WHO's first director-general. Representing the United States on the 18-member executive board is Dr. H. van Zile Hyde, New York, N. Y.

The Pasteur Institute of Paris has invited the World Health Organization to use its laboratories throughout the world in connection with the study of epidemiologic diseases.

## International Reproduction Congress Resolutions

The First International Congress of Physiology and Pathology of Animal Reproduction and of Artificial Insemination adopted seven resolutions at its final plenary session in Milan, Italy, on June 30, 1948. A copy of the resolutions has been filed by Dr. H. E. Kingman, Sr., who served as official representative of the AVMA at the Congress. Briefly, the resolutions provided, and the Congress recommended, that:

1) In recognition of the value of research in this field to livestock improvement, stronger departments be developed in all institutions conducting such research;

2) Full coöperation be developed between workers in various related sciences (*i.e.*, anatomy, animal production, bacteriology, chemistry, genetics, physics, physiology, etc.) within institutions, between institutions within countries, and between and among countries;

3) Strong national animal husbandry and veterinary societies be developed, and that they meet frequently;

4) A standing committee be appointed to plan for future international meetings and congresses of this nature;

(*Note*—This committee has been appointed and is constituted as follows:)

N. Lagerlöf (Sweden), *chairman.*
J. Hammond (Great Britain), *vice-chairman.*
E. Sörensen (Denmark), *vice-chairman.*
T. Bonadonna (Italy), *secretary.*
J. Anderson (Kenya).
E. Garcia Mata (Argentina).
R. M. C. Gunn (Australia).
G. Lesbouyries (France).
B. B. Morgan (U. S. A.).

5) The abbreviation "A.I." be internationally adopted to denote artificial insemination;.

6) Appreciation be expressed to the Italian government for its support and coöperation in making the Congress a success;

7) Gratitude be expressed to the Italian Experimental Institute-Lazzaro Spallanzani and its directors for the work performed.

## Report on AIF Convention

The fifteenth annual program of the Agricultural Insecticide and Fungicide Association was presented at the Essex and Sussex Hotel at Spring Lake, N. J., Sept. 7-9, 1948. Discussions at this meeting pertained to evaluation, use, dangers, and "products liability of recently developed insecticides."

Two speakers reviewed methods which have been used to determine the effectiveness of insecticides on certain insects. The time and number of applications, which usually depend on climatic conditions and insect infestation, were also discussed.

Possible dangers from the extensive use of the new insecticides are: eventual effect on desirable insect population; effect on soil micro-

organisms, particularly those involved in nitrogen fixation; effect on appearance, flavor, and keeping qualities of fruits and vegetables; toxicity of residues on grains and forage for livestock; and effect on wildlife and fish. Studies on the toxicity of the compounds for livestock and the development of antidotes for such poisonings were reviewed.

s/ROGER LINK, *AVMA Delegate.*

## National Dog Week Activities

RESEARCH AWARD FOR 1948

Nominations of candidates for the National Dog Week Research Award are now being accepted. This award, which carries with it $2,000 and a medal, is to be presented to that person who, because of his additions to available knowledge, shall have contributed outstandingly to the welfare of dogs during 1948. The committee is free to make no award at all if, in its judgement, none of the entries is deserving of the honor. Winner of the 1947 Award was Dr. Clive M. McCay (M.D.), of Cornell University, for his contributions to the improvement of health and happiness of "man's best friend" through his studies of dog nutrition.

Candidates for the Award may submit their reports or they may be nominated by a friend or associate, in which case the jury will call for facts and papers on the work involved. Complete rules of the Award may be obtained from the Secretary's office, National Dog Week, 424 Madison Ave., New York 17, N. Y.

TO RECORD IDENTICODED DOGS

National Dog Week headquarters in New York City will maintain a complete file of all identicoded dogs in the United States, under an agreement signed by National Dog Week, Inc., and the National Dog Record Bureau, Los Angeles, Calif., licensee of the Identicode Protection Plan. Identicode, widely used with K-9 Corps dogs during World War II, utilizes figures tattooed under the dog's right hind leg by trained technicians, to establish what part of the country the dog is from, who the owner is, and where he lives.

## Can You Help Locate These Members?

The aid of JOURNAL readers is solicited in locating the following members, mail to whom has been returned to the Association's central office. The last known address of each is given. Should you be able to provide information as to present residence, your advice *via* postcard or letter will be greatly appreciated.

Bush, Dr. Frank J., Savanah, Ga.
Clark, Dr. C. H., 1425 Prospect St., Lansing 12, Mich.
Crane, Lieut. Charles S., APO 239, c/o P.M. San Francisco, Calif.
Fogleman, Dr. Ralph W., 3400 Dartmouth, Dallas, Texas.
Grimes, Dr. Geo. M., Box 291, Covington, Ky.
Hayden, Dr. Wm. J., 51 S. English St., Marshall, Mo.
Henshaw, Dr. Russell J., 550 Kenilworth, Elmhurst, Ill.
Jimenez, Dr. José M., Salvador Cisneros 236, Bauta, Havana, Cuba.
Kissling, Dr. R. E., Virus Disease Laboratory, U.S. Public Health Service, Montgomery, Ala.
Nusser, Dr. William A., Hotel Charles Carroll, Westminster, Md.
Orr, Major Norton A., Med. Detch. Hawaii, H.A.M.A., APO 953, Hickman Field, T. H.
Osborn, Dr. O. H., Box 332, Paynesville, Minn.
Poulson, Lieut. Robert L., 555 E. 1st St., Salt Lake City, Utah.
Sheppard, Dr. A. N., R. R. 4, Box 418, Louisville, Ky.
Silverberg, Dr. Arnold, Rt. 1, Box 628, Jacksonville, Fla.
Steele, Dr. John Rae, Dept. of Pathology and Bact., N. Y. State Vet. College, Ithaca, N. Y.
Summers, Dr. Mark E., 621 N. Glendale Ave., Glendale 6, Calif.
Todorovic, Dr. V., Ukiah, Calif.
Wallman, Dr. Harold, 567 27th St., East St. Louis, Ill.

## National Cat Week

It was in 1944, when he was only 11 years old, that John Newton of Columbus, Ohio, read in the magazine *Cat* that the editor suggested a week be dedicated to the appreciation and understanding of cats. This was shortly after a neighbor had shot John's pet,

and in memory of Fluffy he announced the first National Cat week in 1945. Feline lovers in both Columbus and Cleveland participated in the first celebration. This year, cat clubs and associations in all parts of the nation supported the fourth annual National Cat Week from November 7 to 14. Funds for this project, of which John Newton is still national chairman, come from donations and from the sale of cat week stickers.

For this work, John Newton received the 1946 Humane Act Award of the AVMA.

## STUDENT CHAPTER ACTIVITIES

**Iowa Chapter.**—The Iowa State College Student Chapter of the AVMA met Nov. 9, 1948, in the South Ballroom of the Memorial Union. Dr. Ronald V. Wells, head of the Department of Religious Education, spoke on "Professional

Ethics, Their Origin, and Importance to the Veterinarian.

s/ROLAND C. BUNGE, *Secretary.*

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**Missouri Chapter.**—The Veterinary Club of the new School of Veterinary Medicine, University of Missouri, met in Connaway Hall, Oct. 11, 1948. This organization is composed of members of the junior, sophomore, and freshman classes. Dr. Cecil Elder, professor of veterinary pathology, is the faculty advisor.

s/HAROLD ECKHOFF, *Secretary.*

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**Ohio Chapter.**—The Ohio State University Student Chapter of the AVMA held its first regular meeting of the fall quarter on Oct. 13, 1948. Dean Walter R. Krill welcomed the incoming freshmen, and Dr. Clarence R. Cole, faculty advisor, explained the advantages of becoming an active member of the student chapter. Dr. Leonard W. Goss, professor emeritis and former chairman of the Department of Veterinary Pathology, presented an illustrated discussion on "Dogs."

s/DALE D. KEYSER, *Secretary.*

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**Texas Chapter.**—The Texas A. & M. Student Chapter of the AVMA met Sept. 21, 1948, with the following officers assuming their duties: J. W. Patterson, *president;* Alvin Price, *president-elect;* Melvin R. Calliham, *vice-president;* R. C. Bass, *secretary-treasurer;* W. C. Stewart, *sergeant-at-arms;* A. C. Sears, *reporter,* and Max A. Pachar, *parliamentarian.* The class sponsors are Drs. V. B. Robinson and F. P. Jaggi. Drs. I. B. Boughton, R. C. Dunn, and R. P. Marsteller are honorary sponsors.

Dean I. B. Boughton gave a brief talk on his work in veterinary medicine and research. He also told of the recent reorganization and combining of the School of Veterinary Medicine, Veterinary Experiment Stations, and Texas Veterinary Extension Service under a common head, dean of the School of Veterinary Medicine.

At the second meeting of the chapter on Sept. 28, 1948, M. R. Calliham, student representative to the annual meeting of the AVMA at San Francisco, told of his meeting with Drs. J. G. Hardenbergh and R. C. Klussendorf and other students to discuss closer coöperation between the AVMA and the student chapters. It was suggested that each student chapter send a representative to the annual AVMA meeting.

s/A. C. SEARS, *Reporter.*

## WOMEN'S AUXILIARY

**Florida Auxiliary Organized.**—During the nineteenth annual meeting of the Florida State Veterinary Medical Association in Orlando, Fla., Oct. 24-26, the women's auxiliary to the state association was organized. A year ago, a tentative organization was set up with the purpose of providing a constitution that would meet the requirements of the Women's Auxiliary to the AVMA. The tentative officers were Mrs. J. V. Knapp, *president,* and Mrs. V. L. Bruns, *secretary-treasurer.*

During the recent meeting, 29 new members were added to the Women's Auxiliary to the AVMA, making a total of 51 out of a state membership of 69. Endeavoring to make the state of Florida 100 per cent auxiliary-minded, plans were set up for an active state program with the following members as officers: Mrs. J. E. Scatterday, *president;* Mrs. Ralph Brinkman, *vice-president;* and Mrs. V. L. Bruns, *secretary-treasurer.* The representative to the House of Representatives will be appointed by the president. The state auxiliary will be affiliated with the Women's Auxiliary to the AVMA and will carry out any program that is approved by that organization. Mrs. Anthony E. Bott and Mrs. J. G. Hardenbergh were guests at this meeting.

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**Mrs. Miller, First Vice-President.**—We are proud to introduce Mrs. V. H. Miller, 2636 Kanawah Blvd. East, Charleston, W. Va., first vice-president of the Women's Auxiliary to the

Mrs. V. H. Miller, first vice-president, Women's Auxiliary to the AVMA.

AVMA, who has been a member of the official group and is prepared to carry on her responsibilities in a most efficient manner. To serve the Executive Board as vice-president brings many contacts between the state and provincial groups and the board. Mrs. Miller's chief duty will be to continue organizing state, provincial, and regional auxiliaries and to promote a close relationship with the Women's Auxiliary to the AVMA. She will also sponsor the House of Representatives and work with the officers to bring about a more effective program.

Mrs. Miller wishes to serve the Auxiliary competently and will be grateful for the cooperation of the membership throughout the coming year.

To be selected to serve on the Executive Board of the Women's Auxiliary to the AVMA is indeed an honor, and no one office on the board precedes another in honor, service, or responsibility. Only through the united efforts of the entire group, with each officer under-

standing her executive duties and functions, will our organization prosper in its purpose and program.

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**Southern Association Auxiliary.**—Mrs. A. E. Bott and Mrs. V. H. Miller attended the meeting of the Southern Veterinary Medical Association, Richmond, Va., and assisted in the organizing of the women's auxiliary to this association during the meeting. The following officers were elected: Mrs. C. C. Rife, Atlanta, Ga., *president;* Mrs. Taylor Howe, Richmond, Va., *secretary.* Mrs. Bott and Mrs. Miller had the pleasure of meeting women from each state represented in the southern association.

s/(MRS. A. E.) ETHLYN BOTT, *President.*

# APPLICATIONS

**The listing of applicants conforms to the requirements of the administrative by-laws—Article X, Section 2.**

## First Listing

BEARINT, BERYL I.
7125 Darby Ave., Reseda, Calif.
V.M.D., University of Pennsylvania, 1944.
Vouchers: J. B. Crundwell and E. F. Chastain.

CLARKE, JAMES N.
15 Sherwood Pl., St. Vital, Man.
D.V.M., Ontario Veterinary College, 1942.
Vouchers: J. E. Houston and J. W. Fasken.

COWAN, WILLIAM H.
426 W. North Ave., Baltimore 17, Md.
D.V.M., Ontario Veterinary College, 1942.
Vouchers: G. M. Stewart and W. C. Ready.

DIAZ, ALFREDO REINALDO
Casilla 207, Ovalle, Chile.
M.V., Universidad de Chile, 1939.
Vouchers: J. San Miguel I. and O. Bastias N.

LANGDON, ARTHUR M.
1517 Pennsylvania Ave., R.D. No. 5, Meadville, Pa.
V.M.D., University of Pennsylvania, 1945.
Vouchers: H. P. Prothero and W. P. Bond.

LEWIS, ROBERT V.
1117-L Main St., Watsonville, Calif.
D.V.M., State College of Washington, 1943.
Vouchers: C. S. Brooks and G. J. Freiermuth.

LOVEDAY, RICHARD K.
P.O. Box 1620, Johannesburg, Transvaal, South Africa.
B.V.Sc., University of Pretoria, 1942.
Vouchers: G. Martinaglia and R. C. Klussendorf.

MARCUS, CARLTON P.
1101 Taylor Ave., Halethorpe, Md.
D.V.M., Kansas City Veterinary College, 1917.
Vouchers: C. G. Ziegler and A. L. Brueckner.

MERCHANT, EUSTACE S.
Route 1, Box 210, Reno, Nev.
D.V.M., New York State Veterinary College, 1912.
Vouchers: W. B. Earl and E. Records.

MESENBRINK, ROY L.
201 Avery Dr., Kirkwood 22, Mo.
D.V.M., Kansas State College, 1940.
Vouchers: D. F. McCarthy and E. A. Garleb.

MOWAT, IAN
P.O. Box 1620, Johannesburg, Transvaal, South Africa.
B.V.Sc., University of Pretoria, 1942.
Vouchers: G. Martinaglia and R. C. Klussendorf.

YOUNG, FLOYD W.
1100 Wildwood Dr., East Lansing, Mich.
D.V.M., Michigan State College, 1930.
Vouchers: E. K. Sales and C. S. Bryan.

## 1948 Graduate Applicants

### First Listing

**The following are graduates who have recently received their veterinary degrees and who have applied for AVMA membership under the provision granted in the Administrative By Laws to members in good standing of junior chapters. Applications from this year's senior classes not received in time for listing this month will appear in later issues. An asterisk (*) after the name of a school indicates that all of this year's graduates have made application for membership.**

*Ontario Veterinary College*

AMARASINGHE, DON W., D.V.M.
U. S. Bureau of Animal Industry,
4104 S. Halsted St., Chicago, Ill.
Vouchers: A. D. Woodruff and R. L. Digman.

*Texas A. & M. College*

ROBERSON, ALBERT, D.V.M.
c/o General Delivery, Nocona, Texas.
Vouchers: H. I. Barron and R. P. Marsteller.

THOMPSON, G. CARL, D.V.M.
American Embassy, Asuncion, Paraguay.
Vouchers: A. A. Lenert and H. I. Barron.

### Second Listing

*Alabama Polytechnic Institute*

Brooks, Jonas R., D.V.M., Box 264, Eatonton, Ga.
Compton, Darrell H., D.V.M., Greenwood Veterinary Hosp., Greenwood, S. Car.
Cook, William C., D.V.M., 934 N. Broadway, Knoxville, Tenn.
Dunlap, James R., D.V.M., c/o Dr. L. E. Beckham, Tuscaloosa, Ala.
Ellis, Jesse C., Jr., D.V.M., Zachary, La.
Hays, William L., D.V.M., 771 Holcombe Ave., Mobile, Ala.
Jones, William G., D.V.M., 1000 Loucks Ave., Scottdale, Pa.
Killian, George S., D.V.M., Rt. 1, Portersville, Ala.
Matthews, Watson H., D.V.M., Ebenezer Rd., Rock Hill, S. Car.
Mosely, John D., D.V.M., Bonifay, Fla.
Oliver, Thomas W., Jr., D.V.M., 307 Graham St., Montgomery, Ala.
Peace, John W., Jr., D.V.M., Northwood Acres Veterinary Hosp., Rt. 1, High Point, N. Car.
Purvis, Marley E., Jr., D.V.M., Baxley, Ga.
Turner, Leon W., D.V.M., Louisville, Miss.
Turner, Loyce W., D. V.M., P.O. Box 157 Valdosta, Ga.

*Ontario Veterinary College*
Hanson, Morris, D.V.M., Div. of Animal Husbandry, U. of Calif., Davis, Calif.

*University of Pennsylvania*
Donovan, William D., V.M.D., R. D. No. 2, Box 41, Ligonier, Pa.

*Texas A. & M. College*
McNeill, S. E., Jr., D.V.M., 306 N. Jefferson St., Beeville, Texas.

### Second Listing

Choudhury, Bimolendu, Box 2404, College Station, Texas.
Cline, Clifford M., 25 Brown Ct., Petaluma, Calif.
Kondra, Bohdan, 315 Hurley St., Cambridge 41, Mass.
Korecki, Theodore, 315 Hurley St., Cambridge 41, Mass.
Miller, Frank G., 1220 25th St., Ogen, Utah.
Parker, Luther L., 102 Wayland Ave., Charlotte 6, N. Car.
Pate, Lewis J., 1102 State Office Bldg., Richmond 19, Va.
Pate, Walter E., 516 West Polk, Houston 6, Texas.
Phifer, William G., 317th Sta. Hosp., APO 633, c/o Postmaster, New York, N. Y.
Soler, Jose L., P.O. Box 604, Caguas, Puerto Rico.

## U. S. GOVERNMENT

**Veterinary Personnel Changes.**—The following changes in the force of veterinarians in the U. S. BAI are reported as of Oct. 21, 1948, by Chief B. T. Simms.

TRANSFERS

George A. Ahrens, from Henderson, Ky., to Menominee, Mich.
Ralph C. Fish, Jr., from Baltimore, Md., to Mexico City, Mexico.
James R. Houchins, from Richmond, Va., to Columbia, S. Car.
Ralph V. Kelling, from Denver, Colo., to Mexico City, Mexico.
Paul R. Lanphear, from Mexico City, Mexico, to Springfield, Ill.
Raymond V. Schoentrup, from Boise, Idaho, to Mexico City, Mexico.
Claude Sevy, from Denver, Colo., to Salt Lake City, Utah.
Edward R. Betlach, from Bismarck, N. Dak., to Mexico City, Mexico.
Grant E. Blake, from Mexico City, Mexico, to Salt Lake City, Utah.
Arthur W. Brower, from Topeka, Kan., to Mexico City, Mexico.
Peter T. Curran, from Richmond, Va., to Newark, N. J.

## Student Enrollment for the Academic Year 1948-1949

| Approved Schools | Fresh. | Soph. | Jun. | Sen. | Spec. | Grad. | *Total | 1947 | Change |
|---|---|---|---|---|---|---|---|---|---|
| Alabama Polytechnic Institute | 71 | 61 | 67 | 61 | 0 | 2 | 260 | 266 | — 6 |
| Colorado A. & M. College | 61 | 61 | 61 | 44 | 0 | 2 | 227 | 199 | + 28 |
| Iowa State College | 68 | 73 | 67 | 65 | 0 | 9 | 273 | 211 | + 62 |
| Kansas State College | 70 | 70 | 73 | 60 | 0 | 11 | 273 | 202 | + 71 |
| Michigan State College | 64 | 93 | 65 | 64 | 1 | 35 | 286 | 228 | + 58 |
| New York State Veterinary College | 50 | 46 | 48 | 42 | 0 | 15 | 186 | 143 | + 43 |
| Ohio State University | 70 | 74 | 75 | 67 | 0 | 10 | 286 | 235 | + 51 |
| Ontario Veterinary College | 121 | 127 | 129 | 117 | 0 | 0 | 494 | 455 | + 39 |
| Pennsylvania, University of | 52 | 47 | 42 | 28 | 1 | 0 | 169 | 169 | ... |
| Quebec Veterinary School | 30 | 12 | 15 | 16 | 0 | 0 | 73 | 55 | + 18 |
| Texas A. & M. College | 64 | 77 | 65 | 73 | 0 | 1 | 279 | 266 | + 13 |
| Washington, State College of | 51 | 44 | 42 | 49 | 0 | 2 | 186 | 141 | + 45 |
| Totals | 772 | 785 | 749 | 686 | 2 | 87 | 2,992 | 2,570 | +422 |
| New Schools | | | | | | | | | |
| California, University of | 42 | 0 | 0 | 0 | 0 | 0 | 42 | ... | + 42 |
| Georgia, University of | 52 | 55 | 46 | 0 | 0 | 0 | 153 | 104 | + 49 |
| Illinois, University of | 24 | 0 | 0 | 0 | 0 | 0 | 24 | ... | + 24 |
| Minnesota, University of | 50 | 24 | 0 | 0 | 0 | 0 | 74 | 24 | + 50 |
| Missouri, University of | 31 | 30 | 27 | 0 | 0 | 0 | 88 | 57 | + 31 |
| Oklahoma A. & M. College | 40 | 28 | 0 | 0 | 0 | 0 | 68 | ... | + 68 |
| Tuskegee Normal and Industrial Institute | 16 | 12 | 16 | 4 | 0 | 0 | 48 | 46 | + 2 |
| Totals | 255 | 149 | 89 | 4 | 0 | 0 | 497 | 231 | +266 |
| Totals (approved and new schools) | 1,027 | 934 | 838 | 690 | 0 | 87 | 3,489 | 2,801 | +688 |

*Hold degree in veterinary medicine, working on advanced degree.

John T. Draper, from East St. Louis, Ill., to Columbus, Ohio.

James M. Fancher, from Augusta, Maine, to Boston, Mass.

Charles R. Heath, from Jackson, Miss., to Mexico City, Mexico.

RESIGNED

James V. Bassett, Madison, Wis.
Paul P. Boriskie, Mexico City, Mexico.
Donn B. Campbell, Springfield, Ill.
Harold K. Cohen, Mexico City, Mexico.
Raymond H. Cook, Mexico City, Mexico.
Lewis R. Diamond, Newark, N. J.
Robert T. Habermann, Beltsville, Md.
Thurston W. Haller, Lafargeville, N. Y.
Ferrian Henry, Mexico City, Mexico.
James B. Young, Mexico City, Mexico.
John E. Ketchum, Cheyenne, Wyo.
Edward Newton, Raleigh, N. Car.
Luther S. Peck, Chicago, Ill.
George C. Shelton, Fort Worth, Texas.
Oscar Sussman, New Haven, Conn.
Herbert R. Williams, South St. Paul, Minn.

RETIRED

George W. Knorr, Indianapolis, Ind.
John S. Koen, Des Moines, Iowa.
Harry B. Leonard, Albany, N. Y.

DEATH

Albert D. Conley, Milwaukee, Wis.
Alfred M. Jacoby, Boston, Mass.
Howard M. Newton, Charleston, W. Va.
Lawrence E. Spong, Topeka, Kan.

SEPARATED

Carl J. Fox, Indianapolis, Ind.

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**Examinations for Appointments in Regular Corps of U.S.P.H.S.**—Competitive examinations in the Regular Corps of the U. S. Public Health Service in the grades of assistant sanitarian (first lieutenant) and senior assistant sanitarian (captain) will be held in the near future.

For officers with dependents, entrance pay (without benefits) is $3,811 a year in the assistant grade and $4,489 in the senior assistant grade. Promotions are at regular intervals up to and including the full grade of sanitarian, which corresponds to the rank of major, at $5,822 to $7,981 a year. Promotion to the senior grade (lieutenant colonel) and to the director grade (colonel) is by selection. Retirement pay for the director grade after thirty years' service, or at the age of 64, is $4,950 a year. Full medical care, including disability retirement at three-fourths base and longevity pay, as well as thirty days annual leave with pay, are provided.

## AMONG THE STATES AND PROVINCES

### California

**Southern Association.**—The Southern California Veterinary Medical Association met at the Clark Hotel, Los Angeles, on Oct. 20, 1948. Dr. George McCollister, supervising veterinary inspector of the State Department of Agriculture, spoke on "Bovine Tuberculosis Eradication." Mr. Voorhees, legal advisor, discussed the proposed incorporation of the association.

s/C. E. WICKTOR, *Secretary.*

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**Hits "No Sale" Key.**—At the dispersal sale of the livestock of the famed McGarth ranch at Oxnard in October, bidders paid nearly a quarter million dollars for the dairy cattle, but when 30 purebred Percherons were brought out for auction, it was apparent that the only bidders in sight were horsemeat butchers hopeful of buying the lot at a bargain, whereupon the McGarth's hung up the "No Sale" sign on the ground that these were draft horses, not butcher stuff. The protest made the headlines of the newspapers, for, among horsemen, there is more to be desired than material gain.

s/J. L. TYLER, *Resident Secretary.*

### Colorado

**State Officers.**—Officers elected at the Colorado State Veterinary Medical Association at the annual fall meeting on Sept. 30 to Oct. 1, 1948, are Drs. John W. Thimmig, Brighton, *president;* Stuart Burkhardt, Lakewood, *vice-president;* and W. P. Blake, Greeley, re-elected, *secretary-treasurer.*

s/W. P. BLAKE, *Secretary.*

### Florida

**No Rabies in West Palm Beach.**—The West Palm Beach, Fla., City Health Department has a record of no canine rabies for nearly two years. In order to maintain a rabies-free area, the city and county veterinarian has enlisted the help of the Alfar Creamery, Southern Dairies, Inc., Boutwell's Dairy, and the West Palm Beach Water Company. With the coöperation of these companies, the public is being enlightened about this disease and measures they can take to insure the maintenance of this record.

s/C. T. BUSH, *City and County Veterinarian.*

**ATTENTION DOG OWNERS**

Welcome to the Palm Beaches. We take pride in the health of our citizens—and their pets. That dread disease—Rabies—must be kept out. Please coöperate by keeping newly arrived pets away from other animals for a period of 30 days.

Yearly vaccination of dogs is recommended. It is a prerequisite for licensing in West Palm Beach. Coöperate—observe the quarantine—make the Palm Beaches a happy, healthy place to live.

CITY HEALTH DEPARTMENT,
WEST PALM BEACH
W. E. VAN LANDINGHAM, M. D.
*Health Officer*
CHARLES T. BUSH, D. V. M.
*City Veterinarian*

**Duplicate of card given to every newly arrived dog owner by his milkman or the water company, or both.**

## Georgia

**Antirabic Vaccination Not Harmless.**—According to statistical records of the Georgia Department of Public Health *(Am. J. Trop. Med.*, May, 1948), the frantic resort to antirabic vaccination should be disapproved on the ground that 4 deaths occurred from paralytic accidents out of 50,000 vaccinations, or more than would have occurred from rabies. Antirabic vaccination should be done only in persons actually *bitten or scratched by the teeth of known or suspected rabid animals.* In that event, vaccination is a justifiable procedure regardless of accidents.

## Illinois

**Sixty Years a Veterinarian.**—Dr. L. A. Merillat (ONT '88) celebrates, in 1948, his sixtieth year in the veterinary profession. These years have been spent in unceasing efforts to advance clinical medicine through precept and example. He has championed veterinary organizations and has served his state and national organizations in the important positions of president and secretary. He was also a member of the executive board of the AVMA for many years and is at present editor-in-chief of the AVMA publications.

Dr. L. A. Merillat

A noted lecturer at two veterinary colleges, Dr. Merillat has also addressed hundreds of veterinary meetings, is the author of three popular veterinary textbooks, and is co-author of the only American veterinary history published to date. He has also had numerous articles published in the veterinary periodicals throughout his career.

This year, July 5-9, Dr. Merillat attended the dedication of the new West Wing of the veterinary building of his Alma Mater, the Ontario Veterinary College, and delivered an address there on the significance of the occasion. He was fêted and dined as an honored guest during the four-day ceremonies.—*From The Illinois Veterinary Bulletin.*

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**Conference and Short Course.**—The twenty-ninth annual Illinois Veterinary Conference and Extension Short Course was held at the University of Illinois, College of Veterinary Medicine, Urbana, on Oct. 18-21, 1948. The following program was presented.

Dr. G. W. Hess, U. S. BAI, Springfield: "Foot-and-Mouth Disease in Mexico."

Dr. R. L. West, Minnesota State Livestock Board, St. Paul, Minn.: "Brucellosis Control in Minnesota."

Dr. C. E. Fidler, Division of Livestock Industry, Springfield, Ill.: "Brucellosis Control in Illinois."

A panel discussion on brucellosis included Drs. C. E. Fidler, N. H. Howlett, G. W. Jensen, D. E. Sisk, and R. L. West.

Dr. M. H. Knisley (M.D.), Department of Anatomy, the Medical College of South Carolina, Charleston, S. Car.: "Sludged Blood and Its Consequences."

Dr. G. W. Salisbury, Department of Dairy Production, University of Illinois: "Some Aspects of the Reproductive Efficiency in Cattle."

Dr. A. V. Nalbandov, Department of Animal Science, University of Illinois: "Swine Sterility."

The following speakers are on the staff of the College of Veterinary Medicine, University of Illinois, Urbana:

Dr. P. D. Beamer: "Report of Laboratory Diagnostic Work."

Dr. Jesse Sampson: "Baby Pig Disease."

Dr. S. C. Schmittle: "Egg Test for Newcastle Disease."

Dr. R. E. Witter: "Treatment of Fractures in Small Animals."

Dr. C. C. Morrill: "Transmissible Gastroenteritis in Pigs," "Leptospirosis in Cattle," and "Hyperkeratosis in Cattle."

Dr. R. P. Link: "Recent Observations in Bovine Ketosis."

Drs. E. A. Woelffer and M. E. Mansfield: "Veterinary Extension Activities."

Dr. A. G. Danks: "Wound Infections."

The following motion pictures were shown: "The Effects of Metallic Ions and Osmotic Disturbances on the Heart" by the Audio-visual Center, Indiana University, and "Pharmacology of Respiratory Stimulants" by the Ciba Pharmaceutical Company.

Among the demonstrations were the microscopic and indirect tests for mastitis, blood serum agglutination tests, virus isolation and identification, chemical and other tests for pregnancy, dilution and care of semen, artificial insemination of cows, collection of blood samples, and many others.

s/L. E. BOLEY, *Chairman.*

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**New Secretary of Council on Dental Education.**—Dr. Shailer A. Peterson (D.D.S.), of Harvey, succeeds Dr. Harlan H. Horner as secretary of the Council on Dental Education of the American Dental Association. In his new posi-

tion, Dr. Peterson will continue in charge of the nationwide dental aptitude testing program and will also direct other activities of the Council which includes the accreditation of dental schools and schools for auxiliary dental personnel.

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**Swine Institute.**—The Swine Institute is a project sponsored by the vocational Agricultural teachers in Stephenson County for training students taking farm courses. Dr. M. E. Mansfield, assistant extension veterinarian of the University of Illinois, spoke on "Swine Brucellosis" at the October 9 meeting of this group at Lena. Drs. Chapin and Kingrey of Lena were active in the organization and presentation of the program.

s/C. DON VAN HOUWELING.

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**Poisonous Plants.**—The College of Veterinary Medicine, University of Illinois, issued a timely warning on poisonous plants in August. Special mention was made of whorled milkweed and white snakeroot which never fail to take their toll in the fall of the year when pastures are short and stock turn to eating surviving greens. Dr. M. E. Mansfield of the veterinary faculty is the author.

## Indiana

**Southwestern Association Organized.**—Sixteen veterinarians met at the Emerson Hotel, Princeton, on Oct. 22, 1948, to organize the Southwestern Indiana Veterinary Medical Association. Dr. Harvey F. Page, Washington, who was responsible for the meeting, called the meeting to order and the following officers were elected: Drs. Paul H. Wallace, Cynthiana, *president;* Olen Pumphrey, Fort Branch, *vice-president;* and Joseph H. Lowe, Mount Vernon, *secretary-treasurer.* The Association plans to supply radio programs from Evansville twice a week.

The ladies organized an auxiliary association and enjoyed the banquet with their husbands.

s/J. H. LOWE, *Secretary.*

## Iowa

**Eastern Iowa Association.**—The annual meeting of the Eastern Iowa Veterinary Association at Cedar Rapids on October 14-15, under the presidency of Dr. Laird Woods of Malcom, carried out the traditions of this intrepid organization which has functioned as a local association in the center of America's corn belt for thirty-five years without losing stride at any point of its history. The EIVA has differed from other local societies in never having lost touch with the outstanding problems of the state and nation, as well as those of an important livestock center long populated with a large group of enthusiastic practitioners who have worked not only on the disease problems of their clients but have also passed on their rich experience to the veterinary profession throughout the world. "To get the last word on swine practice, go to the Eastern Iowa meeting" has been a far cry for many years, but that does not signify that other branches of practice and national affairs are neglected. Greetings from the state association, the Illinois Association, and the AVMA by Drs. R. B. Heming, E. T. Anderson, and R. C. Klussendorf, respectively, indicated again the wide interest taken in the work of the EIVA. The program below shows that the big contemporary problems are kept uppermost in mind: inspection of meat and dairy products, application of research findings, and clinical techniques. To know what goes on at Cedar Rapids every October and at the annual clinic every summer, one just has to be there.

After President Laird Woods' address, the program was presented.

Mr. Jerry Sotola, assistant director, Armour's Livestock Bureau, Chicago, Ill.: "Practical Applications of Amino Acid Research."

Mr. H. J. Gramlich, general agricultural agent, Chicago and Northwestern Railway System, Chicago, Ill.: "This Changing World."

Dr. E. M. Berroth, inspector in charge, Meat Inspection Division, U. S. BAI, Cedar Rapids, Iowa: "Practical Meat Inspection Technique for Locker Plants by Veterinary Practitioners." Dr. James D. Ramsey, Tipton, led the discussion on this paper.

Capt. Lloyd V. Fry, V.C., U. S. Army, instructor, Meat and Dairy Hygiene School, Chicago, Ill.: "Promoting Dairy Inspection by Veterinary Practitioners in a Rural Community." Dr. A. R. Menary, Cedar Rapids, municipal dairy inspector, led the discussion on this subject.

Dr. Forest E. Brutsman, Traer: "Business Suggestions for Veterinary Practitioners."

Dr. George R. Burch, director, research farm, Pitman-Moore Co., Zionsville, Ind.: "Veterinary Research and the Present Trend of Veterinary Therapy."

Dr. C. B. Strain, Dunkerton: "Practical Experiences in Bovine Practice."

Dr. C. O. Petry, Ossian, Ind.: "The Importance of Diagnosis in Some Cattle Diseases."

Dr. M. A. Emmerson, professor and head, Veterinary Obstetrics, Iowa State College, Ames: "Bovine Sterility."

Dr. Harold D. Osborne, Gladbrook: "Report of Fourteenth Annual Practitioners' Clinic."

Dr. J. L. Krider, Department of Animal Science, College of Agriculture, University of Illinois, Urbana, Ill.: "Swine Nutrition."

Dr. Joe W. Giffee, veterinary livestock inspector, U. S. BAI, Cedar Rapids: "Swine Disease Problems."

A panel discussion on general practice problems included Drs. J. D. Ray, Omaha, Neb., moderator; Harold Rohwer, Fort Dodge; H. C. Smith, Sioux City; Joe W. Giffee, Cedar Rapids; E. T. Anderson, Dixon, Ill.; M. A. Emmerson, Ames; C. O. Petry, Ossian, Ind.; E. M. Berroth, Cedar Rapids; George A. Hawthorne, Clarinda.

Officers elected at the business meeting were Drs. C. B. Strain, Dunkerton, *president;* George A. White, Riverside, *vice-president;* A. R. Menary, Cedar Rapids, *treasurer;* L. P. Scott, Waterloo, *secretary;* and F. E. Rugger, Oxford, *trustee.*

The ladies' program included a theater program, a luncheon, and a speech on "Juvenile Deliquency" by Chaplain C. E. Burdine,

Iowa State Reformatory. They also enjoyed the banquet with their husbands.

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**Small Animal Association.**—The eleventh annual program of the Midwest Small Animal Association was presented at the Hotel Burlington, Burlington, Iowa, Nov. 18, 1948. Speakers on the program included Dr. W. G. Magrane, Mishawaka, Ind.: "Diagnosis and Treatment of Diseases of the Eye;" and Dr. O. F. Reihart, Omaha, Neb.: "Hematology in Practice."

Dr. J. Porter Coble, Springfield, Ill., was moderator of a forum on "The Care and Treatment of Small Animals." Other members of the panel were Drs. Grant A. Ackerman, Lincoln, Neb.; Joseph H. Krichel, Keokuk, Iowa; W. G. Magrane, Mishawaka, Ind.; and Oliver F. Reihart, Omaha, Neb.

The ladies were entertained at a luncheon and theater party.

s/WAYNE H. RISER, *Secretary.*

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**The Corn Borer.**—Under "Corn Borer a Puzzler," the *Hormel Farmer* gives a gloomy account of this insect pest in southern Minnesota and northern Iowa as of the last of July when it appeared that the region would escape material damage from the corn borer this year. A number of farmers are reported to have sprayed their corn fields with DDT. Helicopters were used because the corn was too tall for ground sprayers.

From the standpoint of economic entomology, the report is more than a mere piece of local news. As if to demonstrate its contempt for human interference with its rights in America, the corn borer proceeded to gnaw its way to the remotest corner of the Cornbelt.

## Minnesota

**Southern Association.**—The Southern Minnesota Veterinary Medical Society met at the Austin Country Club on Oct. 21, 1948. Dr. John R. Dick, Fort Dodge Laboratories, spoke on "Brucellosis and Milk Fever in Cattle."

s/J. B. FLANARY, *Secretary.*

## Missouri

**Greater St. Louis Association.**—The Greater St. Louis Veterinary Medical Association met in the conference room of the Ralston Purina Research Building on Nov. 5, 1948. Dr. E. A. Woelffer, extension veterinarian, University of Illinois, Urbana, spoke on "Hyperkeratosis (X Disease) of Cattle" (with illustrations).

s/W. C. SCHOFIELD, *Secretary.*

**Kansas City Association.**—The guest speaker at the October meeting of the KCVMA was Dr. W. M. Coffee (IND '18), gifted practitioner of La Center, Ky., who spoke at length on "Anesthesia," the subject he presented in a paper read at the San Francisco meeting of the AVMA.

s/EARL L. MUNDELL, *Secretary.*

## New York

**City Association.**—The regular meeting of the Veterinary Medical Association of New York City was held at the Hotel Pennsylvania on Nov. 3, 1949. Dr. Erwin F. Schroeder, chief of staff, Angell Memorial Hospital, Boston, Mass., spoke on "Practical Surgical Techniques for Reduction of Coxo-Femoral Luxations."

s/C. R. SCHROEDER, *Secretary.*

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**Appointments at the Veterinary College.**—Dr. Robert W. Dougherty (OSU '36), formerly chairman of the Division of Veterinary Science and associate professor of veterinary medicine, College of Veterinary Medicine, the State College of Washington, has recently been appointed professor of veterinary physiology in the Department of Physiology, New York State Veterinary College, Cornell University.

Dr. Dougherty received the B. S. degree from Iowa State College, the D. V. M. degree from the Ohio State University, and the M. S. degree from Oregon State College. He taught and was engaged in research work in the Veterinary Department of Oregon State College from 1936 until 1942. He served forty-four months in the Veterinary Corps of the Army of the United States and saw duty in the Philippines, in the Leyte and Luzon campaigns.

Dr. Dougherty's research work has been chiefly in the fields of hematology and ruminant physiology.

Lieut. Col. William E. Jennings (CORN '31) will be in charge of the military training of the R. O. T. C. unit at the Veterinary College and will assist in teaching the course on food quality control.

Following his graduation, Colonel Jennings taught in the Department of Surgery and Medicine at Kansas State College for three years and then entered the Army Veterinary Corps in 1934 and spent six years at various stations, two army veterinary schools, and the University of Kentucky. For four years he was associated with the Army Remount Service, and during World War II, he spent four years in the C. B. I. area. He came to Ithaca from the Veterinary Division of the Surgeon General's Office, Washington, D. C.

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**International Association of Hematologists.**—The first meeting of the International Association of Hematologists was held in Buffalo Aug. 23-26, 1948. An entire day was devoted to the presentation of papers and discussions of hemorrhagic diseases and problems related to blood coagulation. Other papers dealt with anemia, iron metabolism, stable isotopes, blood cell morphology, radioactive isotopes, leucemia, immunohematology, and transfusion. Seventy-two scientific and commercial exhibits illustrated pertinent subjects. Among the papers presented were: "Hemolytic Reactions Produced in Dogs by Transfusion of Incompatible Dog Blood" by Drs. L. E. Young (M. D.) and C. Yuile (M. D.), Rochester, N. Y.; "The Accurate Determination of Hemoglobin" by Dr. E. J. King (M. D.), London, England; and many others of interest to veterinarians.

s /LOIS CALHOUN, *Head, Dept. of Anatomy, School of Veterinary Medicine, Michigan State College.*

**P-E Virus Interferes with Laying Test.**—Egg production in the 1948 western New York egg-laying test was considerably below the previous year, due to a severe outbreak of avian pneumoencephalitis (Newcastle disease) in the test flock, Cornell University reports.

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**New Mastitis Laboratory.**—The fifth field laboratory for use in the New York State mastitis control program was dedicated at Earlville on Oct. 5, 1948. It will serve six counties and has facilities for the analysis of milk within seventy-two hours.

## Ohio

**Animal Nutrition Conference.**—A conference on animal nutrition with special attention to poultry problems was held at the state university on November 11-12. The Poultry Science Club staged turkey-grading and dressing demonstrations in connection with the conference. President Berger, of the American Feed Manufacturers Association, and Vice-President Bowden, of the Grain and Feed Dealers National Association, discussed the coming feed situation.

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**University Celebrates Seventy-fifth Anniversary.**—The Ohio State University commemorated its seventy-fifth anniversary of the opening of classes on Oct. 14-15, 1948. Conferences were held throughout Thursday and Friday and the president's luncheon, attended by delegates and invited guests, was held at noon Friday. Dr. W. R. Krill, dean of the College of Veterinary Medicine at Ohio State, attended as a delegate of the AVMA. The two-day celebration was climaxed by the anniversary dinner at the Neil House on Friday evening.

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**Brucellosis Campaign.**—In a campaign to make Ohio a brucellosis-free state, the Ohio State Veterinary Medical Association has published a bulletin showing how this disease causes financial loss through lower milk production, abortion, and sterility and pointing out the danger of infection to the farmer, his helpers, and his family. The Association distributed 25,000 of the pamphlets at the Ohio State Fair and 6,000 to county agents and veterinarians. The Ohio Medical Association distributed a pamphlet similar to this, stressing the human aspects of brucellosis.

s/F. J. KINGMA, *Secretary*

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**Combine Harvesting Imposes New Hazard.**—The Ohio Grain, Mill, and Feed Dealers' Association, at its meeting in Columbus in June, passed a resolution on the hazards of curing combine-threshed wheat as compared with the shock curing of the former method of harvesting. The problem of preventing spoilage imposes a heavy burden on the handlers of soft winter wheat and the only remedy seems to be the development of wheat varieties that will adapt themselves to combine harvesting and still meet milling requirements.

## Oregon

**Molasses from Wood Wastes.**—Molasses made from Douglas fir wood waste and sawdust is being used in the rations of dairy cattle and swine at Oregon State College, in a long-range study of its feeding value. It is being manufactured in a nearby alcohol plant which has facilities for converting wood cellulose into sugar.

## Pennsylvania

**State Association.**—The sixty-sixth annual convention of the Pennsylvania State Veterinary Medical Association was held at the Penn Harris Hotel, Harrisburg, Oct. 27-29, 1948. The scientific program follows.

Dr. Ralph B. Little, the Rockefeller Institute for Medical Research, Princeton, N. J.: "Bovine Leptospirosis."

Dr. W. R. Krill, chairman, AVMA Executive Board and dean, College of Veterinary Medicine, Ohio State University: "The AVMA at Work" and "Bovine Obstetrics with Special Reference to Embryotomy."

Dr. B. Scott Fritz and Messers. W. Elias and H. J. Merrion, Wyeth, Inc., Philadelphia, Pa.: "Penicillin Concentration in Milk After Eight Hours Following Insertion of Penicillin Bougies."

Dr. A. J. Carlson, president, National Society for Medical Research, Chicago, Ill.: "Animal Experimentation."

Dr. Charles P. Bishop, director, Pennsylvania BAI: "A Brief Review of the Activities of the BAI, Pennsylvania Department of Agriculture."

Dr. Wayne H. Riser, Evanston Ill.: "The Diagnosis and Management of Pyometra in the Bitch" (with illustrations) and "Posterior Paralysis Associated with Herniated Intervertebral Disc in the Dog" (with illustrations).

Dr. John D. Beck, professor of Veterinary Medicine, University of Pennsylvania, School of Veterinary Medicine: "X Disease (Hyperkeratosis) in Cattle."

Drs. D. K. Detweiler and J. E. Martin, Department of Physiology, University of Pennsylvania School of Veterinary Medicine: "The Sulkowitch Test as a Guide in the Diagnosis and Therapy of Bovine Hypocalcemia."

Mr. John O. Almquist, associate professor of Dairy Husbandry, Pennsylvania State College, State College, Pa.: "Physiology of Semen."

The following motion pictures were shown: "Operations Crossroads," U. S. Army; "Tale of Two Cities, Hiroshima and Nagasaki," U. S. Army; "Partner," Ralston Purina Co., St. Louis, Mo.; "Pharmacologic Study of Metrazol," Bilhuber-Knoll Corp., Orange, N. J.; and "Modern Control of Poultry Diseases," Lederle Laboratories.

The ladies enjoyed motion pictures, a tour of department stores, a luncheon, and the banquet.

s/RAYMOND C. SNYDER, *Secretary*.

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**Bucks Montgomery Association.**—The Bucks Montgomery Veterinary Medical Association met in the Moose Home in Doylestown on Oct. 20, 1948. Speakers were Drs. S. F. Scheidy, Drexel Hill; W. Leemann, Zurich, Switzerland; and J. A. Muffly, Lewisburg, who reviewed the San Francisco Convention.

s/H. H. STOVER, *President*.

## Texas

**Dr. Boughton New Dean of Veterinary Medicine.**—Dr I. B. Boughton (OSU '16) has been named dean of the School of Veterinary Medicine at Texas A. & M. College. After serving two years in the Veterinary Corps during World War I, Dr. Boughton taught at the University of Illinois, Urbana, from 1919 to 1924.

Dr. I. B. Boughton

He conducted research in animal diseases while serving as director of the experiment station in Haiti from 1925 to 1931, during the time the United States and the Haitian governments collaborated in operation of that station. In 1932, he joined the staff at the Ranch Experiment Station at Sonora, Texas, where he remained until his appointment as dean on September 1.

Dr. Boughton has also done research on poisonous plants and foot-and-mouth disease and is author and co-author of numerous scientific bulletins and reports and of four texts for use of Haitian students of agriculture. As dean of the School of Veterinary Medicine, he will head all research, teaching, and activities of extension specialists of the Texas A. & M. College in the field of veterinary medicine.

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**Personal.**—Dr. G. H. Allen, formerly of Corpus Christi, Texas, has moved to San Antonio. His business address is 321 E. Commerce St.

## Vermont

**Personal**—Dr. and Mrs. John Thomas, Wells River, celebrated their golden wedding anniversary on Oct. 25, 1948. Dr. Thomas has been in practice for fifty-one years.

## Virginia

**Southern Association.**—The thirty-first annual convention of the Southern Veterinary Medical Association was held in Richmond, Va., on Oct. 11-13, 1948. The Hon. W. Sterling King, Richmond, Va., gave the address of welcome and Dr. J. G. Hardenbergh, Executive secretary of the AVMA, Chicago, Ill., responded. After the president's address by W. M. Coffee, LaCenter, Ky., the scientific program was presented.

Dr. W. A. Hagan, dean, New York State Veterinary College, Cornell University, Ithaca, N. Y.: "The Present Status of Veterinary Education."

Dr. Carl F. Schlotthauer, professor of veterinary medicine, the Mayo Foundation, Rochester, Minn.: "Diagnosis, Treatment, and Prophylaxis of Canine Distemper" and "Some Common Nervous Disorders in Dogs."

Dr. James Farquharson, Department of Surgery and Clinics, Colorado A. &. M. College, Fort Collins, Colo.: "Large Animal Surgery" and "As Jim Does It."

Dr. L. W. Goodman, Manhasset, N. Y.: "The Location, Floor Plan, and Management of Animal Hospitals."

Brig. Gen. James A. McCallam, chief, Veterinary Division, Office of the Surgeon General, Washington, D. C.: "The Army Veterinary Corps of Today."

Dr. Joe F. Knappenberger, Ashe Lockhardt Laboratories, Kansas City, Mo.: "Digestive Disorders of Cattle."

Dr. Stuart Crawford, Garden City Park, Long Island, N. Y.: "Doctor-Client Relationship."

Dr. James H. Steele, chief, Veterinary Public Health Division, Communicable Disease Center, U. S. Public Health Service, Atlanta, Ga.: "The Outlook of Veterinary Public Health."

Dr. J. W. Beard (M. D.), professor of surgery, Duke University Medical School, Durham, N. Car.: "Electron Microscopy of Animal Viruses" (with illustrations).

Dr. J. Lavere Davidson, Medical Division, the Upjohn Co., Kalamazoo, Mich.: "Recent Pharmaceutical Advances Applicable to Veterinary Medicine."

Dr. R. A. Kelser, dean of School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa.: "Veterinary Medicine in Relation to Public Health."

Dr. G. F. Otto, Department of Parasitology, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.: "Filariasis in Dogs."

Dr. F. J. Kingma, Department of Veterinary Physiology and Pharmacology, Ohio State University, Columbus, Ohio: "Fluid Therapy in Small Animals."

Dr. T. T. Chaddock, veterinary director Fromm Laboratories, Grafton, Wis.: "Infectious Canine Hepatitis as it Occurs in the Dog Experimentally."

Mr. H. R. Roberts, regional farm engineer, Portland Cement Association, Atlanta, Ga.: "Sanitation—Concrete and Profits."

Dr. I. Forest Huddleson, research professor of bacteriology, Michigan State College, East Lansing, Mich.: "Vaccinal Immunization of Cattle Against Brucellosis by Means of Mucoid Growth Phase Vaccine."

The ladies were entertained at a luncheon, sight seeing tour, television program, and enjoyed the banquet and informal dance with their husbands.

s/A. A. HUSMAN, *Secretary.*

### Wisconsin

**Milwaukee Association.**—The monthly meeting of the Milwaukee Veterinary Medical Association was held Oct. 19, 1948, at the Wisconsin Humane Society. Mr. D. B. Slauson, of the diagnostic section, General Electric Co., spoke on "X-Ray Technique."

s/K. G. NICHOLSON, *Secretary.*

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**Dane County Association Organized.** — The Dane County Veterinary Medical Association was formally organized on June 3, 1948, at which time the following officers were elected: Drs. C. H. Reading, *president;* C. A. Deadman, *vice-president;* and W. R. Pritchard, *secretary-treasurer.* The Association meets at 6:30 in the Park Hotel, Madison, on the first Thursday of each month, and is open to all veterinarians in, and closely adjacent to, Dane County.

s/W. R. PRITCHARD, *Secretary.*

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**Southeastern Association.** — The Southeastern Wisconsin Veterinary Medical Association met at the Lutheran Church, Columbus, on Oct. 28, 1948. Dr. Arthur Pope (Ph.D.), College of Agriculture, University of Wisconsin, Madison, spoke on "Animal Nutrition."

s/J. O. MCCOY, *Secretary.*

## FOREIGN

### Argentina

**Inter-American Congress on Brucellosis.**—The second Inter-American Congress on Brucellosis was held at Mendoza, Argentina, Nov. 17-20, 1948, and in Buenos Aires on Nov. 22-26, under the auspices of the Argentine government and the Pan American Sanitary Bureau. Among the speakers from the U. S. were Drs. Robert Graham, dean, veterinary college, University of Illinois, Urbana; Harold J. Harris (M.D.), New York, N. Y.; J. F. Griggs, Claremont, Calif.; Leo Lowbeer, Tulsa, Okla.; and H. M. Powell, Indianapolis, Ind.

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**The Brucellosis Problem Looms.**—As a result of brucellosis, the big livestock owners appear to have suddenly realized that they are suffering an annual loss of 100 million pesos in cattle, 12 million pesos in milk, 60 million pesos in swine, and 1.5 million pesos in sheep. In the absence of an orthodox veterinary service, a conference of public health authorities and landowners was called to discuss the disease. A commission of medical and agricultural authorities to study the foci of infection in the country was recommended. The frequency of spondylic localizations in the human cases has aroused interest. In a study of 9 fatal cases, lumbar spondylitis was a prominent lesion.—*J. Am. M. A., Dec. 6, 1947.*

### Denmark

**Eighth World's Poultry Congress.**—The formal opening of the Eighth World's Poultry Congress took place as scheduled on August 20 at Copenhagen under a blare of trumpets and an address of welcome by Prince Knute of the reigning family. Thirty-eight nations were represented and 132 papers were read by reporters from 35 countries. W. D. Termohlen, director of the poultry branch of the USDA, represented the United States. The papers covered the fields of economics, genetics, diseases, and nutrition. The paper of Dr. R. H. Bird, of the U. S. BAI, on the unknown growth factor contained in cow's manure was one of the sensations.

According to the resolutions passed, standardizing (1) laying competition and (2) the grading of eggs are top problems of the poultry field. Cannibalism and feather-eating and thin shells were regarded as major menaces. A heated discussion ensued between our nutritionist, Ray Ewing, and the British veterinarian, W. P. Blount, on the defective-egg question in respect to the cause and treatment. Vitamin A appeared to be a cardinal topic in the field of nutrition. Skogland, Tomhave, and Kish of the Delaware experiment station and Baelum of Copenhagen led the discussion on that subject. The ninth Congress will be held in Paris in 1951. The many details of interest to the veterinary pathologist and clinician will have to be sought in the published proceedings.—*P. B. Paris.*

### France

**International BCG Congress** — The first *Congrès International du B.C.G.* was held in Paris June 15-23, 1948, under the presidency of Prof. Camille Guérin who was enthusiastically acclaimed for his brilliant work of many years on vaccination against tuberculosis. There were 225 official delegates in attendance. The Congress unanimously affirmed that:

1) The study of more than 10,000,000 vaccinations done in various parts of the world during twenty-five years has verified its harmlessness;

2) BCG vaccination is the most efficacious method of preventing tuberculosis;

3) The Calmette-Guérin strain of the tubercle bacillus employed in all parts of the world is obtained from the Pasteur Institute in Paris;

4) The meticulous test of the vaccine conducted at the Pasteur Institute assures its vitality and fixity;

5) BCG provokes a genuine and durable allergy in a short time;

6) The Congress recommend various forms of cutaneous administration;

7) Administration *per os*, for practical reasons, may be employed;

8, 9) (discussed the age factor;)

10) The Congress recommended the use of all other prophylactic measures.

Summed up, the discussions show clearly that BCG vaccination can play a major rôle in the control of human tuberculosis; that it reduces the severity of pulmonary tuberculosis; and promises to lessen mortality in a large way. Of special interest, here, is that vaccination of cattle has been proved effective in the control of bovine tuberculosis.

## Germany

**Foot-and-Mouth Disease.**—The latest information received from the U. S. Zone of Germany indicates there are outbreaks of foot-and-mouth disease in Lands Wurttemberg-Baden and Hesse, and in the northern part of the Soviet Zone.

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**Animal Diseases in British Zone.**—Listed in table 1 are the number of outbreaks of reportable animal diseases in the British Zone of Germany for August, 1948, and the number of cases remaining at the end of the month.

TABLE I

| Disease | Outbreaks | Cases at end of month |
|---|---|---|
| Blackleg | 24 | 4 |
| Coital vesicular exanthema | 0 | 0 |
| Dourine | 0 | 42* |
| Erysipelas of swine | 729 | 27* |
| Fowl cholera | 6 | 0 |
| Infectious equine anemia | 1 | 0 |
| Bovine scabies | 12 | 39* |
| Ovine scabies | 3,425 | 13,354* |
| Swine fever | 11 | 0 |
| Trichomoniasis | 89 | 231* |
| Tuberculosis | 3 | 0 |

*This total includes the infection from previous periods as well as that of the period reported.

S/COL. FRANK A. TODD, V.C.,
*Washington, D. C.*

## Holland

**Morris Fishbein Visits Amsterdam.**—Editor Fishbein's devotion to the history of medicine was the subject of a leading article in *Nederlandsch Tidjdschrift voor Geneeskunde* on the occasion of his recent visit to Europe. The *Tidjdschrift* gave a dinner to the guest of honor and Mrs. Fishbein, at which outstanding figures of the medical profession praised their guest for his leadership in the advancement of medicine throughout the world.

## South Africa

**Dr. Martinaglia Honored.**—A testimonial of long and valued service to the city, given under the seal of the Johannesburg City Council, was presented to Dr. G. Martinaglia (OSU '40), former city director of abattoirs and livestock markets, by Mayor Gordon on Oct. 2, 1948. Dr. Martinaglia, who retired in May, joined the abattoir and livestock department as assistant veterinarian in 1930 and was advanced to director in February, 1948. He was responsible for carrying out veterinary treatment for the Council's animals, including those at the zoo, for the inspection of dairy herds, and the bacterial inspection of the city's milk supplies.

Dr. Martinaglia served on the council of the South African Veterinary Medical Association and the S. A. Association for the Advancement of Science, and was a member of the Royal Sanitary Institute. He is also a member of the AVMA.

## COMING MEETINGS

U. S. Public Health Service. Short Course in Laboratory Diagnosis of Rabies. At the Laboratories of the Communicable Disease Center, Atlanta, Ga., Dec. 6-10, 1948. E. S. Tierkel, U. S. Public Health Service, 605 Volunteer Bldg., Atlanta 3, Ga., acting chief.

Nebraska State Veterinary Medical Association. Annual meeting. Cornhusker Hotel, Lincoln, Neb., Dec. 8-9, 1948. L. V. Skidmore, College of Agriculture, Lincoln, Neb., secretary.

Maryland State Veterinary Medical Association. Hotel Emerson, Baltimore, Md., Dec. 9-10, 1948. J. Walter Hastings, Sr., Box 252, Cambridge, Md., secretary.

New York State Veterinary College. Annual Conference for veterinarians. Jan. 5-7, 1949. W. A. Hagan, 320 The Parkway, Ithaca, N. Y., president.

Ohio State Veterinary Medical Association. Annual meeting. Deshler-Wallick Hotel, Columbus, Ohio, Jan. 5-7, 1949. F. J. Kingma, 121 E. Weber Rd., Columbus 2, Ohio.

Wisconsin Veterinary Medical Association. Annual meeting, Park Hotel, Madison, Wis., Jan. 6-7, 1949. B. A. Beach, University of Wisconsin, Madison, Wis., secretary.

Oklahoma State Veterinary Medical Association. Annual meeting. Skirvin Hotel, Oklahoma City, Okla., Jan. 10-11, 1949. Lewis H. Moe, 408 Life Sciences Bldg., Oklahoma A. & M. College, Stillwater, Okla., secretary.

California State Veterinary Medical Association. Annual mid-winter conference. San Luis Obispo, Calif., Jan. 10-12, 1949. Charles S. Travers, 16th and Mission Sts., San Francisco, Calif., secretary.

Maine Veterinary Medical Association. Annual meeting. Augusta, Maine, Jan. 12, 1949. S. W. Stiles, Falmouth Foreside, Maine, secretary.

Indiana State Veterinary Medical Association. Annual meeting. Hotel Severin, Indianapolis, Ind., Jan. 13-15, 1949. W. W. Garverick, Zionsville, Ind., secretary.

Pennsylvania, University of. Annual conference of the School of Veterinary Medicine, Jan. 14-15, 1949. R. A. Kelser, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa., dean.

Texas State Veterinary Medical Association. Annual meeting. Texas Hotel, Fort Worth, Texas, Jan. 17-19, 1949. E. A. Grist, Box 951, College Station, Texas, secretary.

Intermountain Veterinary Medical Association. Newhouse Hotel, Salt Lake City, Utah, Jan. 17-19, 1949. M. L. Miner, Logan, Utah, secretary.

Iowa State Veterinary Medical Association. Annual meeting. Hotel Fort Des Moines, Des Moines, Iowa, Jan. 18-20, 1949. C. C. Franks, 602 Capital City Bank Bldg., Des Moines 9, Iowa, secretary.

Michigan State College postgraduate conference for veterinarians. Michigan State College, East Lansing, Mich., Jan. 19-20, 1949. C. S. Bryan, School of Veterinary Medicine, Michigan State College, East Lansing, Mich., dean.

Mississippi State Veterinary Medical Association. Annual meeting. Pinehurst Hotel, Laurel, Miss., Jan. 20-21, 1949. S. A. Cox , Jackson, Miss., secretary.

Illinois State Veterinary Medical Association. Annual meeting. Abraham Lincoln Hotel, Springfield, Ill., Jan. 26-28, 1949. A. G. Misener, 6448 N. Clark St., Chicago 26, Ill., secretary.

New Jersey State Veterinary Medical Association. Annual meeting. Hotel Hildebrecht, Trenton, N. J., Feb. 3-4, 1949. J. R. Porteus, p.o. box 938, Trenton, N. J., secretary.

Arkansas State Veterinary Medical Association. Annual meeting. Little Rock, Ark., Feb. 17-18, 1949. T. D. Hendrickson, Route 5, Box 422A, Little Rock, Ark., secretary.

Southeast Missouri Veterinary Medical Association. Spring meeting. Farmington, Mo., April 13, 1949. F. A. Stepp, 405 North St., Sikeston, Mo., secretary.

American Animal Hospital Association. Annual meeting. Edgewater Beach Hotel, Chicago, Ill., May 5-7, 1949. Wayne H. Riser, Box 872, Evanston, Ill., secretary.

American Veterinary Medical Association. Annual convention. Book-Cadillac and Statler Hotels, Detroit, Mich., July 11-14, 1949. J. G. Hardenbergh, American Veterinary Medical Association, 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

Colorado State Veterinary Medical Association. Annual meeting. Shirley Savoy Hotel, Denver, Colo., Sept. 29-30, 1949. W. P. Blake, 2410 8th Ave., Greeley, Colo., secretary.

Chicago Veterinary Medical Association. Palmer House, Chicago, Ill., the second Tuesday of each month. Robert C. Glover, 1021 Davis St., Evanston, Ill., secretary.

Houston Veterinary Medical Association, Houston, Tex., the first Thursday of each month. Edward Lepon, Houston, Tex., secretary-treasurer.

Keystone Veterinary Medical Association. School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa., the fourth Wednesday of each month. Raymond C. Snyder, N. W. Cor. Walnut St. and Copley Rd., Upper Darby, Pa., secretary.

Massachusetts Veterinary Association. Hotel Statler, Boston, Mass., the fourth Wednesday of each month. C. L. Blakely, Angell Memorial Animal Hospital, 180 Longwood Ave., Boston, Mass., secretary-treasurer.

New York City Veterinary Medical Association. Hotel Pennsylvania, New York, N. Y., the first Wednesday of each month. C. R. Schroeder, Lederle Laboratories, Inc., Pearl River, N. Y., secretary.

Milwaukee Veterinary Medical Association. Wisconsin Humane Society, 4150 N. Humbolt Ave., Milwaukee, Wis., the third Tuesday of each month. Kenneth G. Nicholson, 2161 N. Farwell Ave., Milwaukee, Wis., secretary.

Saint Louis District Meetings. St. Louis, Mo., the first Friday of June and November, W. C. Schofield, Dept. of Animal Pathology, Ralston-Purina Co., St. Louis 2, Mo., secretary.

Jefferson County Veterinary Society, Louisville, Ky., the first Wednesday evening of each month. F. M. Kearns, 3622 Frankfort Ave., Louisville 7, Ky., secretary.

Southern California Veterinary Medical Association, the third Wednesday of each month. H. I. Ott, 10326 East Artesia Blvd., Bellflower, Calif., secretary.

Bay Counties Veterinary Medical Association, the second Tuesday of each month. George E. Martin, 530 Stockton Ave., San José, Calif., secretary.

Central California Veterinary Medical Association, the fourth Tuesday of each month. Thomas Eville, Route 1, Box 136H, Fresno, Calif., secretary.

East Bay Veterinary Medical Association, bimonthly, the fourth Wednesday. O. A. Soave, 5666 Telegraph, Oakland, Calif., secretary.

Northern San Joaquin Valley Veterinary Medical Association, the fourth Wednesday of each month. I. N. Bohlender, Box 588, Turlock, Calif., secretary.

Peninsula Veterinary Medical Association, the third Monday of each month. E. W. Paul, Box 866, Redwood City, Calif., secretary.

Redwood Empire Veterinary Medical Association, the second Tuesday of every other month. Charles D. Stafford, Novato, Calif., secretary.

Sacramento Valley Veterinary Medical Association, the fourth Friday of each month. R. C. Goulding, 11511 Capitol Avenue, Sacramento, Calif., secretary.

San Diego County Veterinary Medical Association, the third Tuesday of each month. Mitchell Smith, 3740 Rosecrans Boulevard, San Diego, Calif., secretary.

Orange Belt Veterinary Medical Association, the second Monday of each month. James R. Ketchersid, 666 East Highland Avenue, San Bernardino, Calif., secretary.

Michigan, Southeastern Veterinary Medical Society. Herman Kiefer Hospital, Detroit, Mich., the second Wednesday of each month from October through May.

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## Foreign Congresses

Seventh Pacific Science Congress. New Zealand, Feb. 2-22, 1949. Mr. Harold J. Coolidge, 2101 Constitution Ave., Washington 25, D. C., executive secretary.

Fourteenth International Veterinary Congress. London, England, Aug. 9-14, 1949.

*General Secretary, Permanent Committee:* Prof. L. de Blieck, Kwartellaan 51, The Hague, Netherlands.

*General Secretary, Organizing Committee:* Mr. W. G. R. Oates, 9 Red Lion Square, London, W. C. 1, England

*Secretary, United States Committee:* J. G. Hardenbergh, 600 S. Michigan Ave. Chicago 5, Ill.

## MARRIAGES

Dr. Donald L. Cassidy (KSC '38), Waukon, Iowa, to Miss Barbara Brown, on March 16, 1948.

Dr. Ralph W. Knoche (KSC '43), Adrian, Minn., to Miss Judith May Thorsen, Story City, Iowa on May 23, 1948.

Dr. L. V. Skidmore (KSC '20), Lincoln, Neb., to Miss Alberta E. Wilcox, on July 2, 1948, in Great Lakes, Ill.

## BIRTHS

Dr. (UP '42) and Mrs. Clinton L. Pease, Eighty-Four, Pa., announce the birth of a son, Clinton Linn, Jr., on Dec. 7, 1947.

To Dr. (KSC '41) and Mrs. C. L. Paulsen, Bartlesville, Okla., a son, Kent, on Feb. 8, 1948.

To Dr. (KSC '46) and Mrs. Donald E. Weinman, Columbus, Neb., a son, Larry Gene, on Apr. 11, 1948.

To Dr. (KSC '43) and Mrs. Mark F. Wilson, Rockwell City, Iowa, a daughter, Marilyn Sue, on July 23, 1948.

To Dr. (KSC '43) and Mrs. Arthur D. Robb, Wamego, Kan., a son, Arthur Donald, Jr., on Aug. 13, 1948.

Dr. (ISC '27) and Mrs. Dick N. Voetberg, Traer, Iowa, announce the birth of a son, Dirk Nicolas, on Aug. 19, 1948.

## DEATHS

★**Guy G. Baker** (ISC '07), 63, Spencer, Iowa, died on Aug. 23, 1948. Dr. Baker was a member of the Iowa VMA, the Interstate VMA, and had been a member of the AVMA for thirty-three years.

★**William J. Butler** (NY-AMER '03), 67, Helena, Mont., died on Oct. 27, 1948, after a lingering illness. He was admitted to the AVMA in 1925.

**Harold L. Coffin** (ISC '21), Pleasantville, Iowa, died April 11, 1948.

★**E. R. Crenshaw** (SW '16), 58, Garland, Texas, died on Sept. 8, 1948. Dr. Crenshaw was a member of the State Veterinary Medical Association of Texas, the Fort Worth VMA, and the AVMA.

★**George A. Dick** (UP '04), 70, Philadelphia, Pa., died on Oct. 15, 1948, after a heart attack. Dr. Dick practiced in Kane, Pa., for twelve years and in 1916 was appointed to do research work for the Pennsylvania BAI. He joined the faculty of the University of Pennsylvania in 1917 and, in 1931, became dean of the School of Veterinary Medicine. Early in 1946, Dr. Dick retired as dean to devote his time to research and teaching. He retired from active service at the University with the title of Emeritus Professor of Animal Industry in June, 1948. Dr. Dick was admitted to the AVMA in 1908.

★**Grant I. Fargus** (UP '17), 53, Mercersburg, Pa., died on July 30, 1948. Dr. Fargus was admitted to the AVMA in 1918.

**John B. Finch** (ONT '96), Ramsey, N. J., died Aug. 16, 1948.

**Pleasant J. Huffman** (KCVC '09), Athens, Ohio, died July 18, 1948.

★**Gus H. Huthman** (SAN FRAN '11), 58, Portland, Ore., died June 27, 1948. Dr. Huthman had been a member of the AVMA for thirty-three years.

**Alfred D. Kuhl** (CVC '07), 66, Papillion, Neb., died Sept. 4, 1948.

★**G. Frank McDermont** (ONT '10), 71, Los Angeles, Calif., died of a heart attack while driving his auto on Oct. 12, 1948. Dr. McDermont was noted for his five-gaited show horses, which he bred and trained at his ranch near Pomona. He was admitted to the AVMA in 1929.

★**Lawrence E. Spong** (KSC '37), 44, Wichita, Kan., died Aug. 29, 1948. Dr. Spong was a member of the Kansas State Veterinary Medical Association and of the AVMA.

★**Wallace B. Stafford, Jr.** (TEX '40), 33, Stokesdale, N. Car., died on Oct. 29, 1948, of a heart attack. During World War II, Dr. Stafford served three years in the U. S. Cavalry in Australia. He was admitted to the AVMA in 1940.

**B. J. Timmerman** (CVC '16), Carlyle, Ill., died on July 9, 1948.

★**Harry B. Treman** (MC K '01), 73, Rockwell City, Iowa, died on Sept. 29, 1948. Dr. Treman was a member of the AVMA.

**H. M. Urey,** Fredonia, Pa., died April 27, 1948.

★**Ralph F. Vermilya** (CVC '06), 68, died in Georgetown Hospital, Washington, D. C., Oct. 22, 1948. Born in Crystal Lake, Ill., he entered the BAI Meat Inspection Service after graduation and later served with the Army Veterinary Corps in World War I. After returning to the Bureau, he was assigned to the foot-and-mouth disease outbreak in California in 1924 and later was inspector-in-charge at Wheeling, W. Va.; Detroit, Mich.; and Boston, Mass. Dr. Vermilya retired from the Bureau in 1940 and took a position with Wilson and Company, Chicago, Ill., but returned to the Meat Inspection Service during the last war and was stationed on the Pacific Coast. He finally retired in 1946 and was living in Washington, D. C. at the time of his death. He had been a member of the AVMA for forty years.

Interment was at Arlington National Cemetery with military honors. The deceased is survived by his widow, *née* Anna M. Fandrey.

**Daniel A. Yowell** (WEST '05), Virginia, Ill., died July 14, 1948.

★Indicates members of the AVMA.

# Controlling

## "Shipping Fever" Losses

Field results, as well as extensive experimental work, show that the most efficient and practical method for preventing losses from infections incident to shipment of cattle is the administration of relatively small dosage of

## Anti-Hemorrhagic Septicemia Serum
(*Lockhart*)

1. Immediately before shipment of cattle, inject Anti-Hemorrhagic Septicemia Serum (Lockhart). Dosage 8 to 10 cc per hundred pounds of weight.

2. When it is not possible to make injections before shipment of cattle, the administration of 12 to 15 cc of serum per hundred pounds weight, during or immediately after shipment, produces equally as good results as the above.

3. In some districts and in some seasons, diphtheroid organisms play an important part in the "shipping fever" complex. Under such conditions

## Anti-Corynebacterium Pasteurella Serum
(*Lockhart*)

should be used in place of above.

It is generally recognized that the hemorrhagic septicemia organism plays an important part in the losses incident to shipment of cattle, but many veterinary pathologists believe that filterable virus is often the primary inciting cause of so-called "shipping fever." Because of this possibility, Lockhart Anti-Hemorrhagic Septicemia Serum and Anti-Corynebacterium Pasteurella Serum are produced from mature bovines known to be immune to the various "shipping fevers." In our opinion, this "Plus Value" accounts for the superiority of the results obtained from its use.

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